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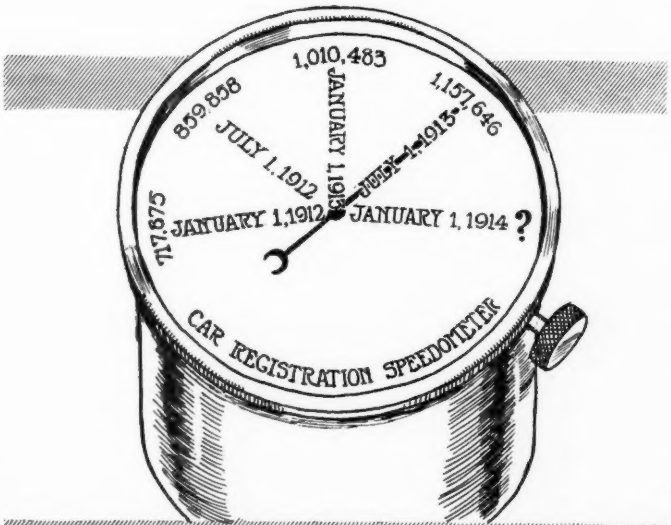
The Automobile

United States Has 1,157,646 Cars

Gain in Registration Since January 1, 147,163 Cars, Allowing for Duplicate Registrations

SINCE the last statistical review of the automobile in the United States was published in The Automobile of January 30 of this year, progress has been such that the total registration of cars in use has been swelled by 147,163, making the total today 1,180,240 vehicles. This means that the average daily addition during the past 181 days has been 813.5 cars, averaging $1,000 in value; a daily investment of more than three-quarters of a million. This one fact alone should suffice to convince anybody and everybody that the automobile industry today stands among the most powerful and most important of American manufactures. There can hardly be found a more striking illustration of the rapid progress of life and commercial development in this country than the advance of the automobile industry.

While this is true, progress in registration is not equally rapid in all the states. In fact, the rate of increase is by far stronger in the Middle West and West than it is in the East. A fitting proof of this statement is the fact that California, with 88,699 cars at the end of January, has since gained nearly 20,000, while New York's sum of 105,546 has been increased by only about 5,000. Undoubtedly the Golden state represents the grand hope of the automobile industry for the immediate future. As the tabulation at the bottom of this page shows, California does not stand alone as a demonstrator of the growing buying power of the West. Iowa, now ranking as the sixth state in order of total registrations, was seventh 6 months ago, and Nebraska rose from twelfth to tenth positon. Missouri, Wisconsin and Washington show similar advances.



REGISTRATION IN EACH STATE

New York	110,618	South Carolina	10,500
California	108,156	West Virginia	9,249
Illinois	76,039	Colorado	9,300
Ohio	74,625	North Dakota	8,697
Pennsylvania	66,488	North Carolina	8,678
Indiana	61,712	Maine	8,540
Iowa	55,601	Florida	8,361
Massachusetts	52,193	Kentucky	8,256
Michigan	47,198	Oklahoma	8,000
Nebraska	42,451	Virginia	7,406
Minnesota	39,000	Louisiana	6,898
Texas	38,000	Rhode Island	6,173
New Jersey	36,666	New Hampshire	6,023
Missouri	32,088	Alabama	5,170
Wisconsin	29,750	Vermont	4,655
Kansas	27,000	Wyoming	4,478
Georgia	21,210	Montana	3,759
Washington	20,000	Utah	3,299
Connecticut	19,005	Arkansas	3,000
Maryland	12,355	Mississippi	3,000
Tennessee	12,200	Idaho	2,700
Oregon	11,929	Delaware	2,118
South Dakota	10,913	New Mexico	1,500
Dist. of Columbia	10,829	Arizona	1,037
Nevada	823		

The diagram illustrates in a graphic manner the wonderful increase in the number of automobiles in the United States

The figures given in this article include the number of transfers of ownership of cars, necessitating re-registration as well as the duplicate registrations arising from the registration of cars in two or more states by the same owners. Of course, in several of the states no record has been kept of the transfer of ownership, etc., but this is more than counterbalanced in most cases by the dealers who carry a number of cars on the same license.

The tabulation on page 181 shows the states arranged in alphabetical order. Attention is called to the fact that the figures of the first column, being the total numbers of cars registered in the several states, were almost without exception obtained from the secretaries of state at considerable expenditure of work. In other words, they are fully authentic

Registration of automobiles in each state July 1, 1913, due allowance having been made for duplicate registration

and therefore reliable. The same obtains to the figures of the other columns, showing the classification of vehicles under the headings of gasoline and electric passenger and commercial cars. The non-resident registration and re-registration in the cases of cars changing hands could not be obtained from the state secretaries in many cases, but the classification before mentioned compensates almost completely for this shortcoming.

The comparison, in this tabulation, between the Empire and Golden states brings out the fact that with regard to gasoline cars California is undisputedly in the lead. This applies to both passenger and commercial vehicles, and it indicates the importance of local natural resources for an industry the products of which utilize these. This is once more shown by the tremendous plurality of electric cars in New York state, where, especially in the northwestern section, electric power abounds. New York is ahead of California, however, in the use of motor trucks. The East seems to take the automobile more seriously than the West, so far as the buying class is concerned. The next two states, Illinois and Ohio, do not differ materially either in their total registrations or in the vehicles of various classification, these going remarkably parallel. Indiana, next in magnitude, is especially strong in regard to gasoline trucks. In Iowa the automobile is almost entirely used for personal transportation, indicating the high degree of prosperity and the ease with which money flows in that section. Massachusetts is as conservative and practical as ever, trucks constituting a goodly percentage of the whole registration; here electrics are also holding a firm position. Michigan's position as an au-

The eight states included in the above diagram all have a registration of over 50,000 cars. California has nearly equaled New York's registration in the past 6 months, and may soon surpass it

tomobile-using state has been advanced by nearly 8,000 over 1912 figures, though motor power does not seem to be appreciated as widely in commercial class of vehicles. Nebraska is in a similar position, resembling also that of Iowa on account of the huge passenger car registration and the few trucks in use there. Minnesota is distinguished by its strong support of electrics, both passenger and commercial cars. Texas, too, appreciates electrics, although this refers to passenger cars much more than to trucks.

New Jersey has experienced a serious setback in the number of cars registered there, as a reward for beating the safe-and-sane trail in the line of ordinances compelling would-be owners to conform to an examination of driving ability. There are also some non-residents who were forced to register under the old law who do not do so now. However, it is very probable that this setback will be overcome soon, and that other states will follow the example. Missouri, Wisconsin, Washington, Tennessee and all the other states indicate interesting relations between local conditions and the automobile's status there, which are too numerous to be all treated here. One thing, however, stands out of this huge mass of facts and would-be facts, namely, that sellers' energy has sometimes much more to do with the large or small registration in a state than local conditions. Otherwise, electrics would not often be numerous in territories where power is dearer than in others which have fewer cars. This should be very encouraging to all car makers.

It is a curious fact that Pennsylvania leads in truck registration, so much more as this

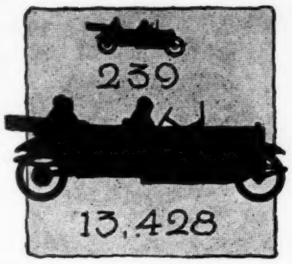
state is relatively of small importance as an automobile-producing state. But, of course, it is a large manufacturing territory requiring adequate means of transportaton; still, the modern spirit expressed in the use of 23,000 motor trucks contrasts strongly with that of Indiana, which uses no more than 4,500 trucks, although its total registration is only some 7 per cent. less than Pennsylvania's. New York is second with 10,296, and California third with 9,156 commercial cars. Now come Illinois and Indiana, both ranging close 4,400 trucks. At the end of the steadily decreasing number of truck registrations is that of Nevada, which is 36.

There is another way of gauging progress of the automobile in the various states. It consists in not only considering the direct increase in registration, but also the rate of that increase over the registration of half a year ago. Among the states of the Union the following have increased their automobile contingents by one-third or more:

Washington, Montana, Wyoming and New Mexico in the West and Southwest; Minnesota in the Middle West; Arkansas, Kentucky, West Virginia and the two Carolinas in the South.

A registration increase of more than 5,000 cars during the past 6 months, is shown by:

Washington and California in the West; Minnesota, Iowa, Nebraska, Wisconsin, Illinois, Indiana, Michigan and Ohio in the Middle West; Kansas and Missouri in the South; New York and Pennsylvania in the East.



Only 239 cars imported in 1913; 13,428 machines exported

Value of 1913 imports, $518,407. Value of exports, $13,833,328

The states appearing under both headings, namely, Minnesota and Washington, are therefore relatively the strongest gainers. Motor interests in these states have lately made a lively fight for an increase of their ranks.

There are today 1,095,181 passenger cars and 80,853 trucks registered as in use in the United States; or, classified by their method of motion, 1,122,221 gasoline and 53,813 electric vehicles.

	Number	Per cent.
Passenger	1,095,181	93.12
Commercials	80,853	6.88
Gasoline	1,122,221	95.42
Electrics	53,813	4.58

Most of these cars, or practically all, are American made. The number of imported cars is so small as to constitute only .162 per cent. of the cars traded during the last half-year. Compare with a total of 147,163 automobiles added to the number of January last the number of foreign cars, namely 239, an astonishingly small quantity. These 239 cars, imported during the first 5 months of 1913, were valued at a selling price over here of $518,407, making the average car price $2,432.67, while American exports during the same period totalled 13,428 automobiles, aggregating $13,833,328, the average price per exported car being $1,032.23, less than half that of the imported product.

Automobile Registration in Each State in the Union up to July 1, 1913, with Duplicate Registrations

State or Territory	Total Registration	New Registrations	Registration to 1913	Gasoline Passenger Cars in Use	Gasoline Commercial Cars in Use	Electric Passenger Cars in Use**	Electric Commercial Cars in Use**	Non-Resident Regtrations*	Re-Registrations ***	Remarks
Alabama	5,200	800	4,400	4,900	100	165	5	30	......	
Arizona	1,109	......	1,624	903	46	84	4	......	72	
Arkansas	3,000	750	2,250	2,887	75	25	13	......	......	
California	111,656	19,457	92,199	95,600	8,400	3,400	756	3,500	......	Perennial registration
Colorado†	9,300	350	8,950	8,050	270	900	80	......	......	No state registration
Connecticut	19,005	1,055	17,950	25,750	640	600	115	......	......	
Delaware	2,130	398	1,732	1,957	110	38	13	12	......	
District of Columbia**	11,629	Decrease	12,689	10,000	267	530	28	800	......	Perennial registration
Florida	8,368	1,619	6,749	7,500	194	397	36	......	7	Perennial registration
Georgia	22,210	3,070	19,140	20,180	500	470	30	......	1,000	
Idaho†	2,700	200	2,500	2,570	85	45	......	......	......	No state registration
Illinois	76,039	8,026	68,013	68,413	4,380	2,700	546	......	......	
Indiana	61,713	7,379	54,334	55,184	4,320	2,010	199	......	......	
Iowa	55,601	8,413	47,188	52,001	500	3,000	100	......	......	
Kansas**	27,000	5,000	22,000	25,640	620	620	120	......	......	No state registration
Kentucky	8,256	3,109	5,147	7,397	700	139	20	......	......	
Louisiana	6,898	2,031	4,867	6,860	86	70	22	......	......	New law
Maine	8,740	597	8,143	8,344	286	5	1	200	......	
Maryland	12,355	1,868	10,487	11,325	820	125	35	......	......	
Massachusetts	52,468	381	52,087	46,136	3,796	1,808	253	275	......	
Michigan	47,198	7,619	39,579	43,798	1,900	1,000	200	......	......	
Minnesota	39,000	10,000	29,000	36,325	1,850	720	105	......	......	
Mississippi†	3,000	105	2,895	2,895	50	50	5	......	......	State law declared void
Missouri	32,733	8,354	24,379	29,579	1,400	959	150	......	645	
Montana	3,759	1,759	2,000	3,653	90	36	......	......	......	
Nebraska	42,451	8,590	33,861	39,107	840	120	6	......	......	
Nevada	833	313	520	784	36	3	......	......	10	
New Hampshire	6,538	2,049	4,489	6,002	74	37	......	275	240	
New Jersey	38,480	Decrease	43,056	36,206	1,370	500	404	......	1,1814	
New Mexico	1,500	589	911	1,433	50	17	......	......	......	
New York	115,021	9,475	105,546	94,651	7,986	6,300	2,310	1,535	2,868	
North Carolina	8,678	2,500	6,178	8,321	210	140	7	......	......	
North Dakota	8,747	Decrease	9,000	8,592	150	5	1	......	50	
Ohio	74,700	11,571	63,129	66,879	3,600	3,800	346	75	......	
Oklahoma	8,000	1,476	6,524	7,794	112	92	......	......	......	
Oregon	12,129	1,963	101,66	10,951	589	350	38	......	200	
Pennsylvania	69,788	10,431	59,357	38,236	18,250	9,557	4,750	1,000	2,302	
Rhode Island	6,173	156	6,017	7,650	773	255	42	......	......	
South Carolina†	10,500	500	10,000	10,099	316	79	6	......	......	Local registration
South Dakota	15,913	1,432	14,481	14,595	260	52	6	......	5,000	
Tennessee	12,200	2,227	9,973	11,855	240	90	15	......	......	
Texas†	36,000	2,813	35,187	35,623	1,704	600	63	......	......	Local registration
Utah	3,299	1,492	1,807	3,149	......	146	4	......	......	
Vermont	4,890	607	4,283	4,645	120	48	2	......	135	
Virginia	7,606	1,846	5,760	7,167	160	63	16	200	......	
Washington	20,000	6,000	14,000	19,203	580	175	42	......	......	
West Virginia	9,249	3,900	5,349	9,003	160	80	6	......	......	
Wisconsin	30,000	5,422	24,578	28,525	500	300	75	250	250	
Wyoming	4,478	1,178	3,300	4,045	300	120	13	......	......	New law
	1,180,240	168,870	1,017,774	1,052,356	69,865	42,825	10,988	8,152	12,779	

NOTE.—1,000 steam passenger cars are included among the gasoline passenger cars. Dots indicate that previous figures were doubtful. *The number of cars registered belonging to residents of another state. **Some figures from state registration officials, balance form estimates given by local authorities. ***Cars re-registered owing to transfer of ownership. †Estimated on basis of population with reference to location and sectional registration.

De Dion Six-Wheel BUS CHASSIS

Buses with Doubled Space for Fares Built to Relieve Congested Traffic in the French Capital

PARIS, FRANCE—A six-wheel omnibus, built by De Dion Bouton under Gros patents, is now being experimented with in Paris. This vehicle, which is designed for city omnibus service, has two central driving wheels and two pairs of steering wheels. Its general design is similar to that of the four-wheel omnibuses now in service in Paris. The motor is 50 horsepower with separate cylinders of 4.9 by 5.9 inches placed behind a Solex circular-tube radiator and having the driver's seat above it. Transmission follows the usual De Dion Bouton practice with three-speed gearbox and final drive by transverse cardan shafts. The only difference is that, instead of the rear pair of wheels, it is the central pair which are driven.

The suspension of the chassis is a distinguishing feature and is governed by the Gros patents. The rear end of the forward spring and the front end of the central semi-elliptic are shackled to the pivoted beam, shown in the illustration at the top of this page. This is hung below the main frame member. There is a similar shackling arrangement between the front end of the rear spring and the rear end of the central spring, the pivoted beam being shown at the bottom of the opposite page. In addition there is a balance beam within the inverted U-section frame member from the forward shackle of the rear spring to the front shackle of the central spring. This main beam, being within the frame member, is invisible, and at the rear is attached to both the rear spring and the rear extremity of the balance beam between the central and the rear springs.

The same principle of balance levers is applied to the rear suspension of the chassis, the beam in this case being within a transverse frame member and having the extremity of the rear semi-elliptic springs shackled to it.

The inventor claims wonderfully easy riding qualities from this system of suspension. The central wheels are shod with twin rubber tires and the front and rear wheels with single rubber tires.

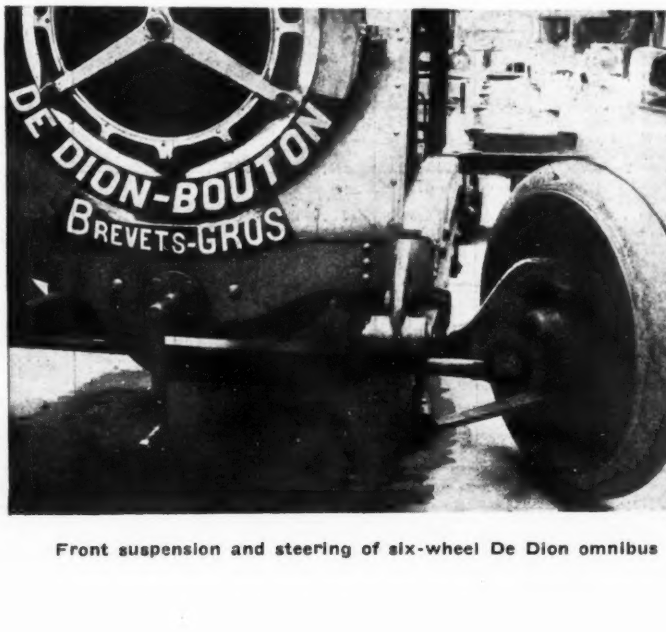
Steering is duplicated so as to control both the front and the rear set of wheels together. Although the machine has a wheelbase of 21 feet 4 inches and an overall length of 29 feet 6 inches it can turn in a circle of less than 48 feet external diameter. The present four-wheel machines, with a much shorter wheelbase, are required to turn in a 42-foot circle.

While the turning radius of the vehicle by this system is reduced to that of a four-wheel omnibus of one-half its wheelbase under most circumstances, the same cannot be said to be the case when the turn is begun from a position alongside of the street curb. It then shares the inconvenience attaching to vehicles which are steered by the rear wheels. To avoid driving the rear wheels into the curb, the vehicle must first be driven forward with a very slight turning motion until the curb is cleared sufficiently, before the sharper turn can be attempted.

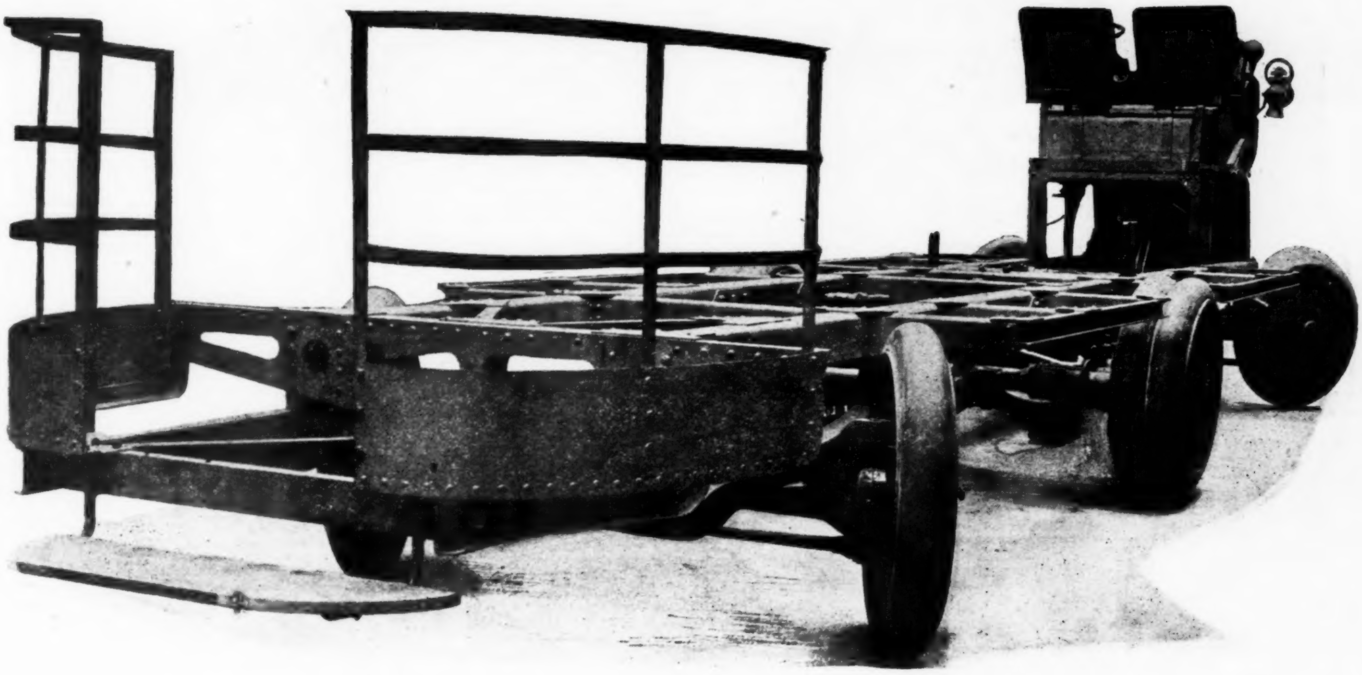
Finances and Maintenance System of Paris Omnibus Co.

According to the annual report of the management of the General Omnibus Company of Paris for the business year 1912 a net revenue of about $400,000 was realized, which corresponds to a profit of 7 centimes (1 2/5 cents) per vehicle per kilometer, or almost as much as the surface street car companies are making, while, on the other hand, a continuation of the old system of traction by horses would have led to a deficit of $330,000, corresponding to a loss of about 35 centimes (7 cents) per vehicle-kilometer, on the basis of the small number of lines to which the company was reduced when the change to the motor system was inaugurated.

Some of these lines were continued and, owing to the better service given the public by the motor system, the receipts have been gradually doubled, tripled and quadrupled. The increasing demand for the transportation then led to placing more vehicles



Front suspension and steering of six-wheel De Dion omnibus



Six-wheel bus chassis in the position of making a turn, the driving wheels in the middle tracking the shortest curve

in commission than it had been contemplated to operate. The surplus now amounts to about 100 omnibuses, from all of which profits are also secured. Financial improvement was especially remarkable since 1909, when vehicles of new design were put in circulation. New lines were established, and old ones were resuscitated which had been abandoned under the horse system because the competition with the underground had diverted the patronage upon which they depended.

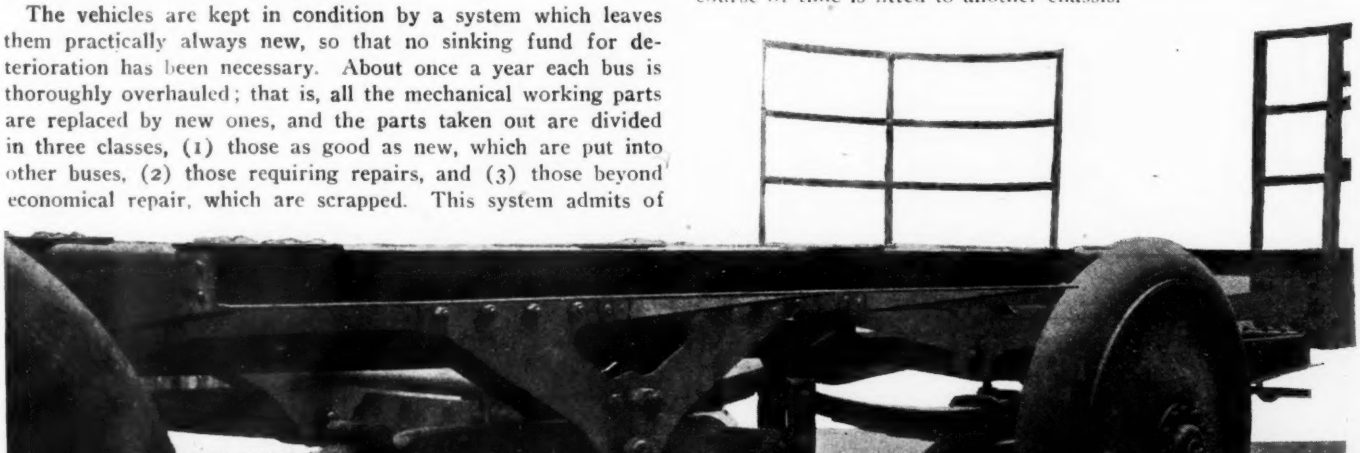
The consumption of benzol per vehicle for each 100 kilometers was at first 50 liters, but has been reduced to 43 liters by careful advance testing and subsequent maintenance of the motors. The life of tires has been increased from 15,000 to 20,000 kilometers during the first years to 30,000 to 40,000 kilometers more recently, without great addition to their first cost.

Periodical Renewal of All Working Parts

The vehicles are kept in condition by a system which leaves them practically always new, so that no sinking fund for deterioration has been necessary. About once a year each bus is thoroughly overhauled; that is, all the mechanical working parts are replaced by new ones, and the parts taken out are divided in three classes, (1) those as good as new, which are put into other buses, (2) those requiring repairs, and (3) those beyond economical repair, which are scrapped. This system admits of introducing new improvements piecemeal and keeping the stock up to date in matters bearing upon economy and convenience.

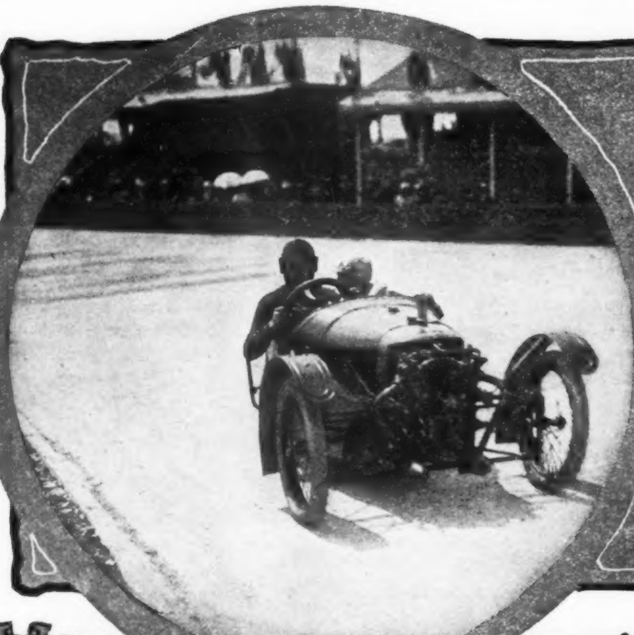
It is now proposed to establish a reserve for the care of the rolling stock, but this is not to meet increased operating expenses but in order to introduce more radical improvements which, it is figured, will shortly pay for themselves and furnish a margin of profit beside.

One of the most important economical elements in the maintenance system referred to is that it never takes an omnibus out of circulation for more than one day, as this short period is sufficient for replacing all the working parts with new ones and the repairs are made independently of the traffic. Even when the bodies have to be renovated and repainted, the change is accomplished by replacing the body with another one which is in presentable order, while the old one goes to the shops and in due course of time is fitted to another chassis.



Enlarged view of balance beam suspension of vehicle springs between rear steering wheels and the driving wheels

Cycle Cars IN ACTION In Their First Great Race

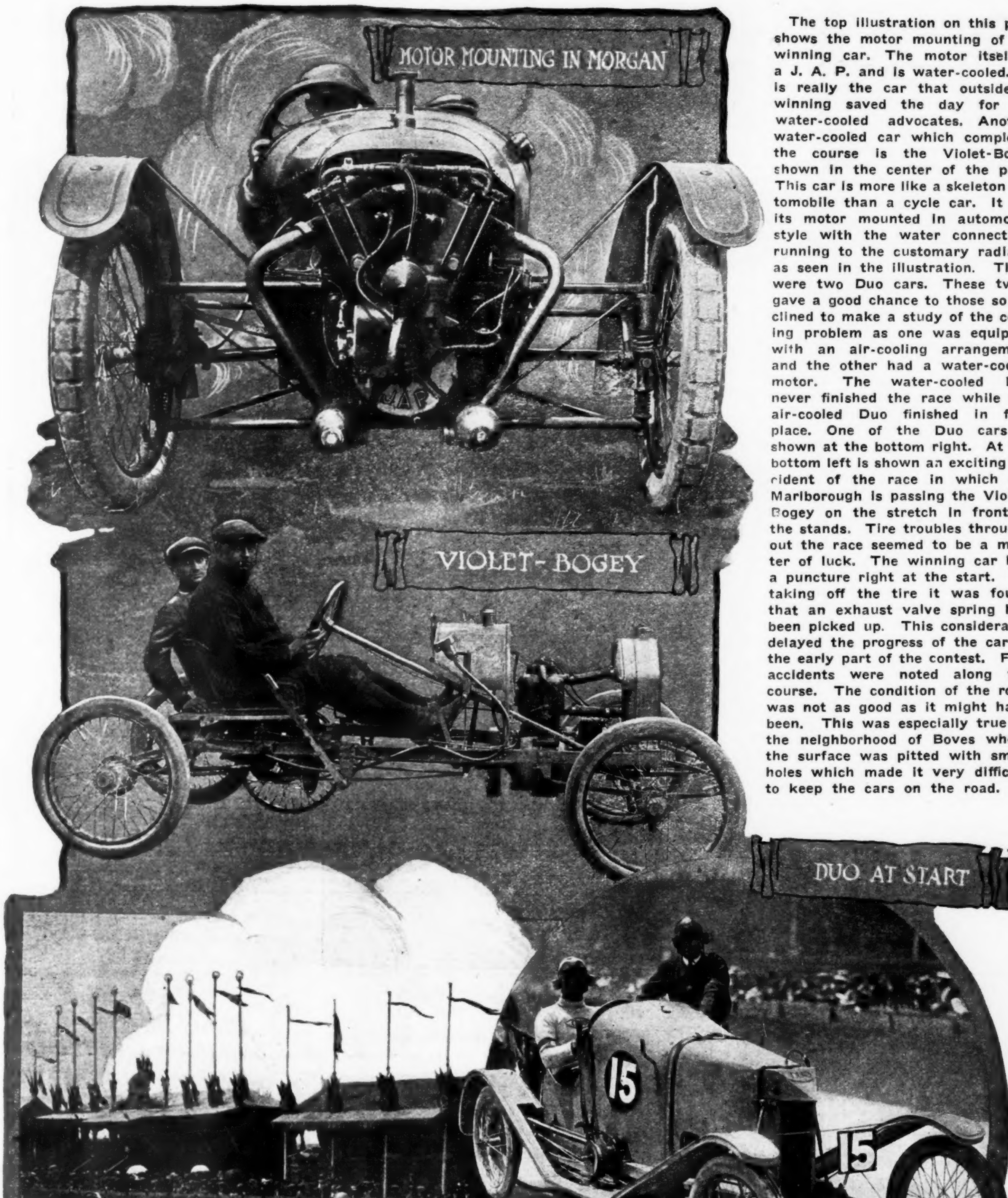


McMINNIES ON MORGAN

BOURBEAU ON BEDELIA

CANOUEL ON SPHINX-GLOBE

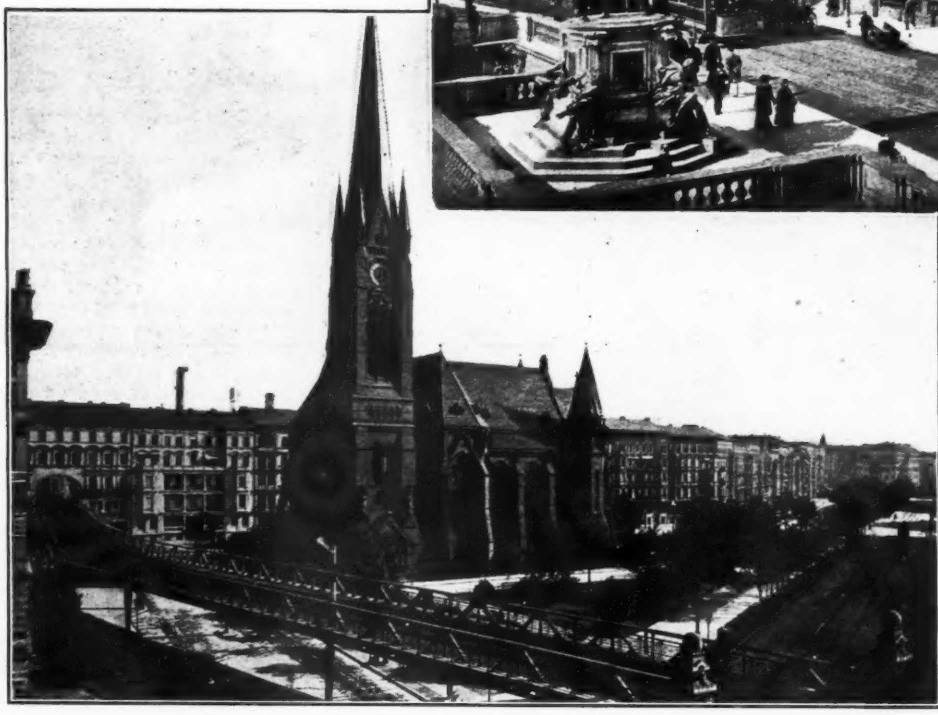
THE upper illustration shows the Morgan car which won the recent Cycle Car Grand Prix. This car covered the course in 3 hours 53 minutes and 9 seconds. Not 3 minutes after this car had flashed across the line, M. Bourbeau in the Bedelia car, shown in the center illustration, completed the circuit. The Sphinx-Globe car, driven by M. Canouel, shown in the lower illustration, was the third to finish. All three of these cars are of distinctly different types as the characteristics visible in the illustrations will show. The winning car was water-cooled, the second was air-cooled, and the third also air-cooled. Water-cooled cycle cars on the whole did not show up as well as the air-cooled. A notable example of the single-cylinder air-cooled car is the Sphinx-Globe which won third place and which is shown herewith.



The top illustration on this page shows the motor mounting of the winning car. The motor itself is a J. A. P. and is water-cooled. It is really the car that outside of winning saved the day for the water-cooled advocates. Another water-cooled car which completed the course is the Violet-Bogey shown in the center of the page. This car is more like a skeleton automobile than a cycle car. It has its motor mounted in automobile style with the water connections running to the customary radiator as seen in the illustration. There were two Duo cars. These twins gave a good chance to those so inclined to make a study of the cooling problem as one was equipped with an air-cooling arrangement and the other had a water-cooled motor. The water-cooled Duo never finished the race while the air-cooled Duo finished in fifth place. One of the Duo cars is shown at the bottom right. At the bottom left is shown an exciting incident of the race in which the Marlborough is passing the Violet-Bogey on the stretch in front of the stands. Tire troubles throughout the race seemed to be a matter of luck. The winning car had a puncture right at the start. On taking off the tire it was found that an exhaust valve spring had been picked up. This considerably delayed the progress of the car in the early part of the contest. Few accidents were noted along the course. The condition of the road was not as good as it might have been. This was especially true in the neighborhood of Boves where the surface was pitted with small holes which made it very difficult to keep the cars on the road.

Berlin's Splendid

Berlin may well be called the city of beautiful buildings and spotless streets. In this illustration may be seen the Royal Palace and the palace plaza. This is the home of the Emperor. Another statue of one of Germany's heroes is shown in the left-hand corner of the photograph. This also shows one of the city's brick pavements. The chief places where wooden pavement is used is in the approaches to the bridges, the engineers claiming that this sort of material has the effect of preventing the horses from slipping and automobiles from skidding



One of Berlin's magnificent edifices, the Luther Church on Bulowstrasse. An oddity in elevated railroad construction may be seen, showing the tracks running through a building perforated to save the company extra expense in running the line in another direction. These elevated roads are kept as much as possible off the main thoroughfares, but the stations are so placed as to afford convenient transportation facilities for the public

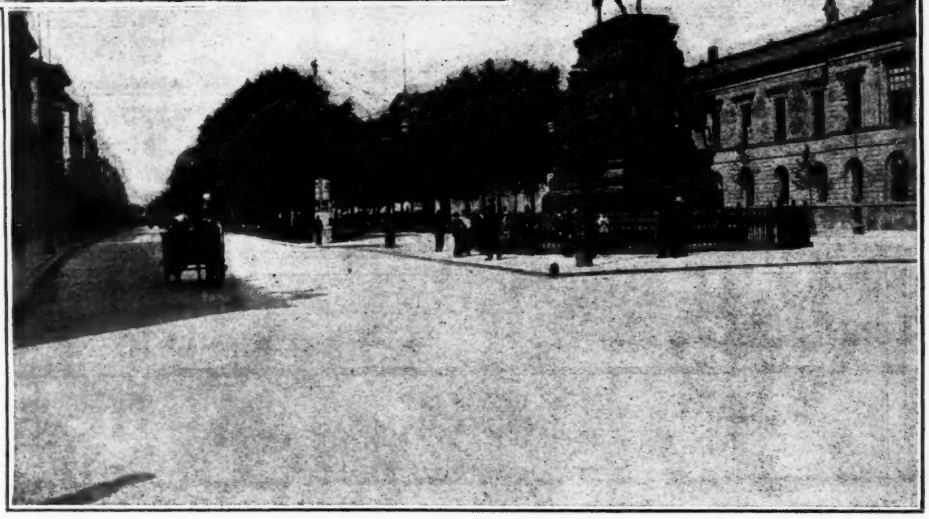
THE city of Berlin, Germany, possesses 7,754,065 square yards of street pavements. The city looks after the up-keep of seven-tenths of this pavement, which is exclusive of the footpaths, while the street railway companies and outside contractors maintain the remaining three-tenths. The kinds of pavement used include 41.35 per cent. of asphalt, 51.63 per cent. of larger grades of stone; 5.04 per cent. of the smaller grades of stone; 0.06 per cent. of slag stones, pebbles, cement, and macadam over concrete; and 1.92 per cent. of wood. In almost every section of the city where the inferior grades of stone are in use asphalt is replacing the old pavements. The chief places where wooden pavement is used is in the approaches to the bridges, the engineers claiming that this sort of material has the effect of preventing the horses from slipping and automobiles from skidding; while the wood endures the vibrations of the bridges better than either asphalt or stone. It was once the custom in Berlin to use only blocks of Swedish pine; however, this class of wood has now almost entirely given way to black butt and hard woods imported from Australia.

The up-keep of the street pavements cost Berlin in the neighborhood of $390,000 annually, including amounts of money contributed by the street railway companies. This latter grant was made at the time the street cars were drawn by horses, the city being obliged in those days to keep the space between the rails in repair—about 44 inches—as well as a space 24 inches wide on the outer side of each rail. This work is done in the most artistic and workmanlike manner.

The cost of placing asphalt pavements on one-track lines is 20.5 cents per each, running 3.23 feet; on double-track lines it is 37.6 cents for asphalt; stone, single-track lines, 5.2 cents; double-track lines, 9.5 cents; wooden pave-

Automobile Streets

One of Berlin's business streets, Invalidestrasse. Wide thoroughfares constitute one of the many assets of that city's roads, which means lack of congestion. Berlin cleans her streets well. The surface cleaned, this service including all footpaths, amounts to about 320 miles annually. The upkeep of the street pavements cost Berlin in the neighborhood of $390,000 annually, including amounts of money contributed by the street railway companies.



Unter den Linden, Berlin's beautiful boulevard. This extends for several miles, affording shade and comfort for the pedestrian as well as the road user. A statue of Frederick the Great, one of the beautiful monuments, is depicted. This street is a sample of Berlin's traffic conditions, showing cleanliness and a smooth surface. Nearly all of the streets are beautifully paved, affording smooth riding to the thousands of automobilists. The Kaiser has a large fleet of automobiles, and these may each day be seen carrying him to and fro from his many duties

ments, single-track lines, 20.5 cents; double-track lines, 37.8 cents, comparing favorably with American figures.

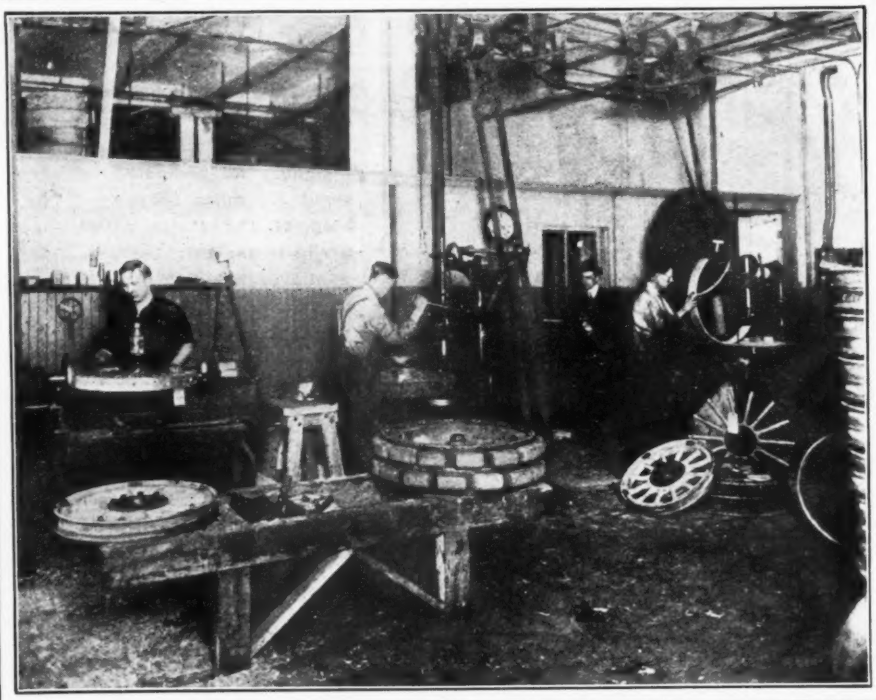
Berlin has four phases of traffic to look after in the maintenance of her streets: automobiles, horse-drawn vehicles, cavalry and infantry. The authorities are very proud of the fine appearance of the streets and especially on account of the automobiles, of which the Kaiser alone keeps a large fleet. He also maintains half a dozen garages outside of Berlin.

Berlin cleans her streets well, the surface cleaned—this service including all footpaths—amounting to 12,800,000 square yards annually, or 320 square miles. To accomplish this work a crew of 2,000 "white wings" are employed, this number comprising 500 street-sweeping boys. The wages for this work aggregate about $660,000 annually. There are overseers who each receive $1.13 daily, this wage being increased to $1.19 daily after 3 years. A wage of 89 cents daily is paid the laborers up to 3 years and then $1.07 daily. The street-sweeping lads get a little above 47 cents daily for 3 years and after that about 53 cents per day.

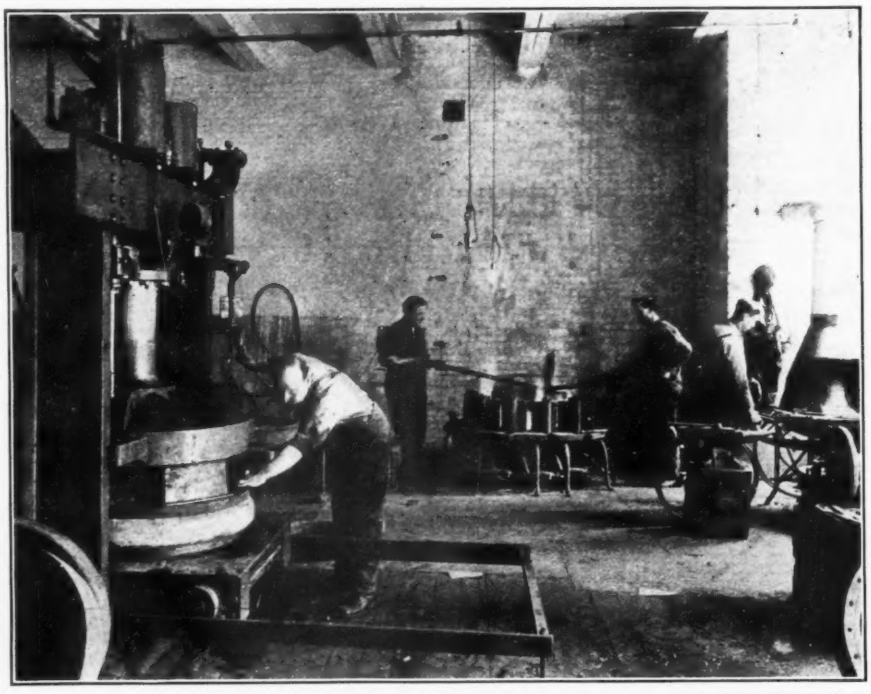
A contractor is paid on an average of $250,000 yearly for carrying away the street sweepings—about 200,000 loads. Snow is removed by a sum paid per load, a hard winter necessitating the expenditure of $350,000 for snow alone. The outlay for keeping the streets clean runs from $1,425,000 to $2,225,000 yearly. Then there is the expenditure for sprinkling the streets, from $116,000 to $152,000 annually.

But after all of this work is properly attended to, the streets of Berlin present conditions for the driving of automobiles which are not alone in excess of many other large cities, but the excellence of which constitute a fascinating temptation to drive a motor car over their finely paved surface.

Special Shops for Goodyear Service



Woodworking shop for Goodyear service plants. In this shop there is a band saw, lathe and drill press with which any of the woodwork necessary to the wheelwright's trade may be accomplished without the length of time necessary if this had to be done entirely by hand work



The interesting feature in the metal working shop is the hydraulic press which has been adopted in the Goodyear truck service stations for putting on the heavy truck tires. With this machine the pressure is exerted uniformly around the rim and the tire is pressed on quickly and without distortion

Hydraulic Press for Putting on Heavy Truck Tires

SPECIAL machinery is not confined alone to factory use but is also of exceptional benefit for use in connection with service plants. The two illustrations herewith show shops and machines that are in use by the Goodyear company taking care of repairs and emergency jobs.

The upper illustration shows the shop wherein the woodwork is done on wheel repair work. The machine at the left shows a lathe for turning the assembled wheel or other woodwork. In the center is a drill press which pierces the holes necessary for the assembly of the rim. The band saw shown at the right is used in the manufacture or repair of the felloe band.

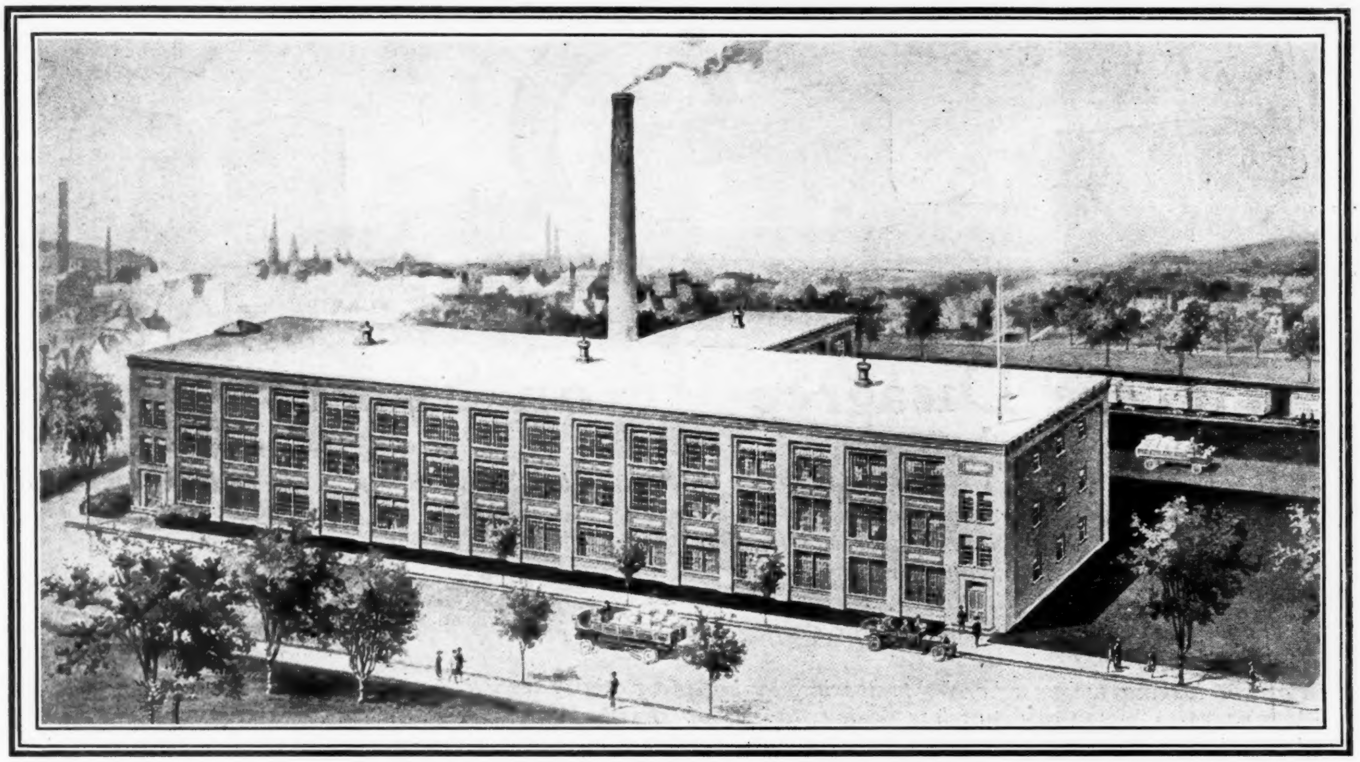
Big Press for Fitting Tires

The lower illustration shows the metal and pressing work. The machine in the foreground is the standard type of hydraulic press that will be used in all Goodyear truck service stations. The purpose of the machine is the application of the tires to the rims. The wheel is placed on a bedplate and the tire put over it and then the bedplate is rolled under the press and by opening the valve the water pressure is exerted. The tire is thus put on in a very short space of time and the work done as well as if it had been done at the home plant.

The work on the bed plate is greatly facilitated by the rollers and track which enable the workmen to push the plate beneath the press and withdraw it rapidly and without great physical effort.

In the background is shown the hand types of furnace and forge to be used in the wheel repair work. The two workmen at the furnace are heating a rim preparatory to shrinking it onto the wheel. With this equipment the needs of any customers desiring repair work can be easily fulfilled.

As a whole, the shop is finely equipped for the particular service to which it is adapted. Machines for work of this nature are different than those of a factory where large output in a limited time is aimed at, because a standard set-up cannot be used as often as is the case in factory work.



Exterior view of the new plant of the Standard Woven Fabric Co., South Framingham, Mass. From an architect's drawing

New Woven Fabric Plant

THE Standard Woven Fabric Co. is now located in a new factory at South Framingham, Mass. This will mean the abandonment of the old plant at Worcester, where facilities were inadequate to meet the growth and expansion of the company's business.

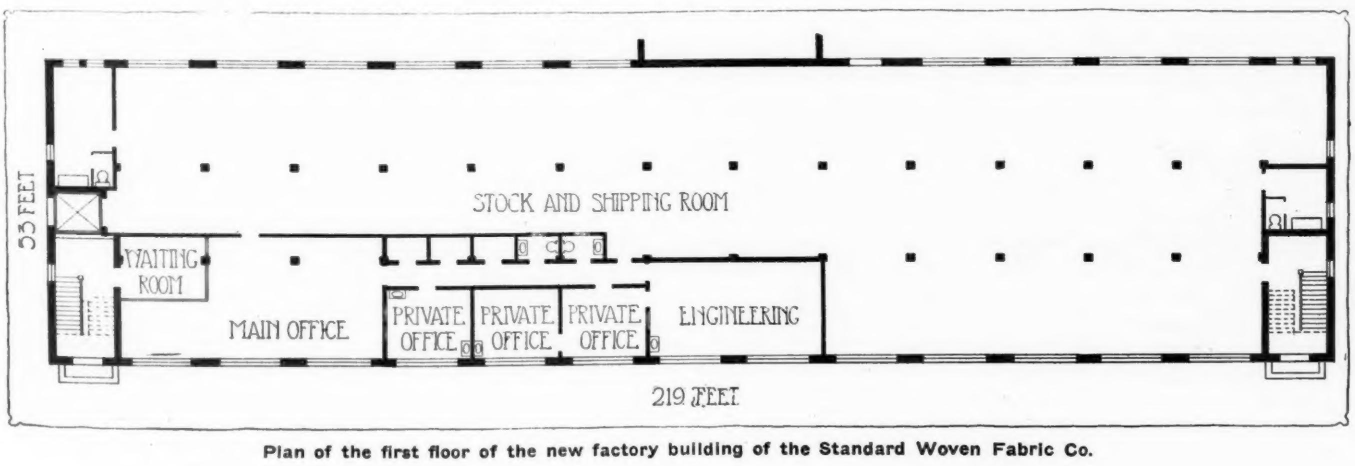
Machinery and equipment have been installed which will produce at least 5,000,000 feet of brake lining during the coming year. Mr. Burdick, the general manager of the company, says that allowance has been made whereby the company could easily double this output in brake lining should the demands of the coming year make it necessary to do so.

But even with this large production of brake lining the company's business is by no means confined to this department. Hose fabric and cotton belting will be manufactured as formerly, as well as numerous specialties in cotton and asbestos, and clutch facings in special forms and sizes.

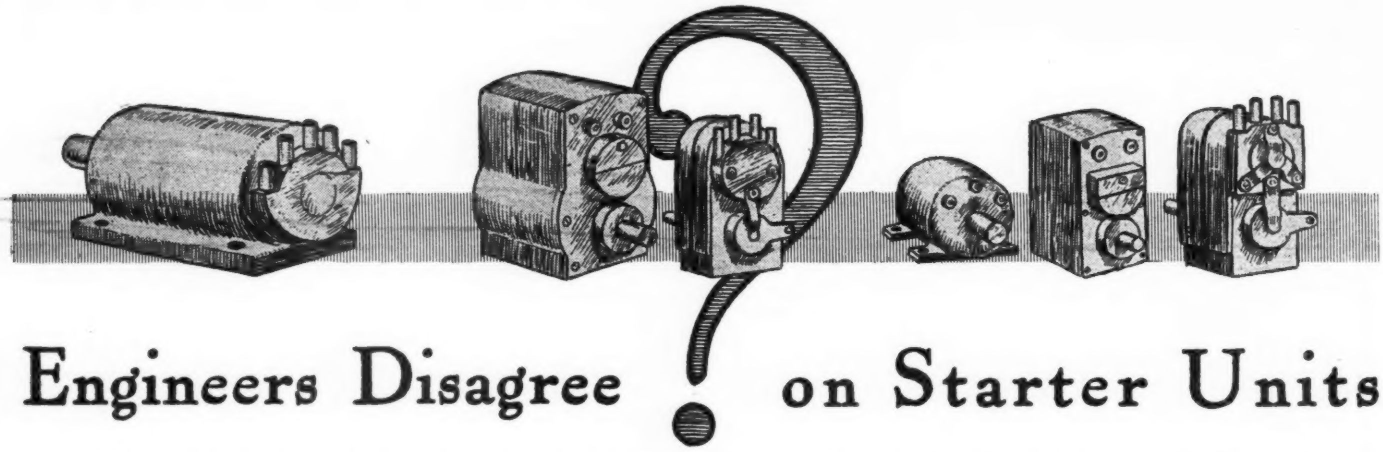
As will be seen from the cut here shown, the new factory is ideally located for freight service on the main line of the B. & A. R. R. Boston and New York are within easy reach and fast lines to the West are also accessible.

All of the machinery which has been installed is of the most modern and advanced type. It is particularly interesting to note that the company has not purchased a single loom and that every one of the machines in the weave room are made in its own machine shop under design and direction of E. E. Waite, the factory manager, and under patents held by the company. Special machines and processes for the treatment of the finished fabric are also provided.

The building itself is of fireproof construction and of the type known as "the daylight factory," with a great expanse of window space. The foundations, floors, and columns are reinforced concrete and the walls are brick. Power is furnished by the Boston Edison Illuminating Co., while the heating is looked after by a Robb-Brady Scotch boiler of 150 horsepower. Connected with the boiler is a Sturtevant-Carrier system, which insures a uniform temperature and humidity in the building the year round. Much of the new equipment has been paid for out of the company's earnings, although additional preferred stock for over $100,000 has been issued in this connection. There still remains a large block of the common stock in the treasury.



Plan of the first floor of the new factory building of the Standard Woven Fabric Co.



Engineers Disagree ? on Starter Units

1—*Which will be the eventual system, namely, (a) Unit system in which starting, lighting and ignition are combined; (b) Two-unit system in which starting and lighting are combined with ignition separate; (c) Three-unit system in which ignition, starting and lighting are separate?*
2—*Respective methods of coupling starting motors with the gasoline motor?*
3—*Possibilities of weight reduction in starting systems?*
4—*Increased accessibility of the battery for starting and lighting purposes and if excessive initial draw from the battery is injurious?*
5—*Positive locking means whereby tampering by outsiders cannot lead to shorting and discharging of batteries?*
6—*Movement to discourage senseless demonstrations of starting motors in which they are used to propel the car for a short distance?*

Self-Starter Engineers Discuss the Relative Merits of the Three Systems—Two-Unit System in General Favor—Ward Leonard Favors Three-Unit Methods

MANY requests have reached this office regarding the relative merits of the various systems for electric lighting, ignition, and electric starting. The three systems are: 1—Unit system in which ignition, starting and lighting are combined; 2—two-unit system in which starting and lighting are combined with ignition separate; 3—and three-unit system with ignition, starting and lightng. In order to get the vews of the engineers of the various companies manufacturing electric outfits, they were asked the six questions printed above. These same questions were asked the leading engineers of automobile concerns. This week the first series of answers are published, being from concerns manufacturing starters. In later issues reveiws of automobile engineers will appear.

Separate Unit Systems Final—Kebler

BRONXVILLE, N. Y.—Editor THE AUTOMOBILE—First: I believe that the eventual system will be the separate-unit system in which the lighting and starting are separate. That is, there will be separate armatures and separate field windings for each, and the ignition will be separate in the form of a high-tension magneto.

In case a cheaper form is desired I believe the system will consist of a separate starting and a separate lighting system with a battery-ignition system mounted upon the lighting dynamo, so as to be driven by the lighting dynamo shaft.

Under all circumstances I believe that, whether the dynamo frame and the motor frame are bolted together into one unit or mounted separately, there will always be separate armatures for each, separate fields for each, and separate brushes for each.

Second: The respective methods of coupling starting motors with the gasoline motor are dependent upon the design of the engine. Whether drive is by silent chain from the crankshaft to an overrunning clutch, or whether by meshing with gears to the flywheel, will depend upon the preference of the individual engineer.

Third: There are two methods of reducing the weight in the starting system: One consists of running a very high-speed electric motor with a large gear reduction, and the other running a low-speed electric motor with a much lower gear reduction. The weights almost balance, because the extra gears necessary with a high-speed light motor make the weight about the same as the heavy weight low-speed motor without the gears.

Tampering With Systems Is No Danger

Fourth: So far as I know, all good automobile manufacturers today provide ample accessibility to the battery. You ask if excessive initial drawing from the starting battery is injurious. This depends entirely upon how the starting battery is designed, and, of course, may depend entirely upon your definition of the word "excessive," because if a starting battery is designed to stand a certain current, that current is not excessive.

Fifth: From my experience it is not necessary to have any lock to prevent tampering from outsiders. We have been in the automobile lighting and starting business as long as, if not longer than, any one else in this country, and have not heard of any cases where trouble has been caused due to the above-mentioned tampering.

Sixth: I do not believe that it is necessary to have any "movement to discourage senseless demonstrations of starting motors in which they are used to propel the car for a short distance," because I think that there should be an interlock so that the electric-starting motor cannot be operated unless the clutch is opened, and if this interlock is in place no such movement as you speak of is necessary.—L. KEBLER, president, Ward Leonard Electric Co.

Choice Depends on Motor Size—Bailey

ANN ARBOR, MICH.—Editor THE AUTOMOBILE—Regarding the choice between single, two-unit and three-unit systems for the starting, lighting and ignition of automobiles we believe in distinguishing between high-power and low-power starting outfits. We consider a low-power outfit one in which the motor develops

not over about 0.75 horsepower while it is turning the engine over. This means a speed of about 150 revolutions per minute for a four-cylinder engine 45 cubic inches capacity per cylinder corresponding to the usual engine rating 25 or 30 horsepower. The speed would be correspondingly less for a larger engine. For service similar to the above we have developed and advocate a single-unit system. If, for any reason such as accessibility, it seems preferable with a particular make of engine to drive the timer and distributer from another part of the engine we see no objection and have arranged our apparatus so that this may be readily done. Usually, however, it is somewhat simpler and cheaper to install the apparatus complete.

In the case of larger engines demanding from 1 to 1.5 horsepower, or with smaller engines when very high speeds are required, we prefer to supply the lighting generator and the ignition apparatus as a unit, the starting motor being a separate unit. The reason for this attitude is that while the power of the starting motor increases rapidly with the size of the engine, the capacity of the generator need not increase nearly so fast. The starting function therefore demands a proportionately greater amount of power than the lighting and it becomes possible to design a two-unit system weighing no more than the single-unit outfit.

Another reason we have for developing a two-unit set in addition to our single-unit system is the fact that it is sometimes difficult to find room to install one of these systems on account of interference with some part of the auxiliary mechanism of the gasoline engine.

Battery Ignition Is Deemed Advisable

Regarding the use of battery ignition or magneto ignition we are very strongly convinced of the superiority of the former for use with electric lighting and starting outfits. It is possible to give a stronger spark, particularly at low speeds, and with even greater reliability.

We do not consider the question of weight a serious one at the present time. Our single-unit outfit weighs 53 pounds. A suitable battery will weigh in the neighborhood of 47 pounds, giving a total weight of about 100 pounds. From this, however, must be deducted the weight of the magneto, the gas tank and some saving in the weight of the lamps. These three items will approximate 40 pounds, giving a net added weight of about 60 pounds. The above starting outfit develops slightly over 1.4 horsepower and is easily capable of rotating a 30 horsepower engine in excess of 150 revolutions per minute.

Our double-unit outfit develops 2.7 horsepower and gives a net added weight of about 70 pounds. This figure varies somewhat with the type of gearing adopted.

The gearing used with the above outfits varies from 8 to 1 to 20 to 1. With a higher ratio of gearing it would, of course, be possible to cut the above weights very decidedly. Thus we could develop double the power from either of our outfits by doubling the speed and the gear reduction. This leads to costly and inefficient gearing. On the other hand, by making a direct-connected outfit we could save the cost of gearing but at the expense of a heavy and inefficient starting motor. We believe that we, in common with the majority of manufacturers, are striking about the golden mean.

The question of the amount of power required by an electric-lighting system has assumed considerable prominence in the past few weeks, and it has even been asserted by some that the mileage per gallon is reduced as much as 10 per cent. by the addition of a lighting generator. That it should require one-tenth as much power to rotate a little generator weighing less than 20 pounds as it does to propel a 2,000-pound touring car is absurd on the face of it. To make the matter clearer, however, I have prepared the accompanying curves. These are the result of careful test with accurately calibrated instruments:

Curve A shows the power required to operate our model L-I generator at different car speeds with average gear ratio between the engine and the rear wheels.

Curve B shows the power necessary to operate an ordinary magneto. Since our outfit provides the power for both lighting and ignition I have subtracted the magneto power from the generator power giving curve C. This is the net additional power required from the engine. It will be seen that at the maximum the power required is about 0.09 horsepower. If the engine is developing, say, 10 horsepower, this is less than 1 per cent. of the total power. The reduction in mileage would therefore also be less than 1 per cent.

We are aware that there are lighting outfits on the market which from the method of regulation adopted are necessarily inefficient. The facts in regard to the generators mentioned are obvious to any electrical engineer and are not at all open to question. Such a generator might take perhaps as much as three to five times the power as shown on the curves. Even so, the reduction in mileage would be comparatively insignificant.—Benj. F. Bailey, Bailey Electric Co.

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Utmost Efficiency Main Thing—Hartford

Jersey City, N. J.—Editor The Automobile—The subject of starting systems is a pertinent one, especially as the people are paying, I should say conservatively, $10,000,000 yearly for this convenience.

I think the electric starter has, undoubtedly, come to stay, because it combines the electric lighting, which is, at least from my point of view, superior to everything else.

It seems to me that the ideal electric starter would be one which would really be 100 per cent. efficient, in that it would start an engine instantly and every time, even in the coldest weather, and also one that would start the engine, not when everything is tuned up to its maximum point of efficiency, but when everything is out of order. That is, if it would be possible to run the engine at all, the starter would immediately set it in motion.

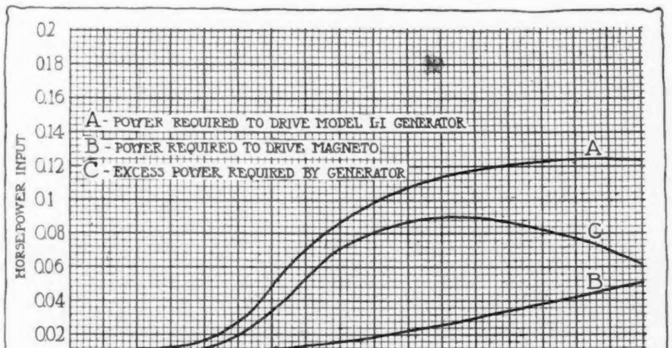
To maintain this ideal condition the starter must be of reasonable price, take up a minimum of space and of minimum weight.

This would seem almost a dream and impossible of practical attainment, for naturally one can see that to get this result it would be necessary to have an electric power plant from one-quarter to one-half the horsepower of the gasoline engine itself and this would mean with a car of ordinary horsepower, close to 1,000 pounds would have to be carried, which would, of course, be impracticable.

After working on this problem for nearly 4 years, we believe that we have attained all the above ideals.

We have an outfit smaller and lighter than anything else. The total weight is under 150 pounds, yet in the operation of starting the motor we develop at the compression points from thirty to forty times the horsepower of all other electric starters.

At first thought, this seems an extraordinary statement, but it is a very simple matter to prove it because we are actually doing



Relative power required to drive three types of generator

it. I will take for example the engine with which we are demonstrating this starter. This is a four-cylinder stock Continental engine, 5-inch bore, 5.75-inch stroke and 80-pound compression. On a 9.5-inch radius at a speed of 180 revolutions per minute this takes 300 pounds pull past the compression point. By multiplying this we get a little over 8 horsepower delivered at the compression point, or thirty to forty times the power delivered at the compression point by most starters.

Inefficiency of Present Equipment

With the ordinary starter battery, 6 volts, 120 ampere-hour capacity, if we keep well within the capacity of the battery, we can only take from it 5.5 volts times 120 amperes, or 660 watts, considerably less than 1 horsepower. However, we will presume that we are taking 1 horsepower from the battery. When the 1 horsepower motor has the load of this compression it is overloaded to a point where the efficiency will certainly not be more than 25 per cent., probably 15 per cent. Consequently, this will leave it only 0.25 horsepower to push past the compression point, and it is a very simple matter to figure that with 0.25 horsepower against this load of 300 pounds on a 9.5-inch radius, will figure out a speed past this load of 5.5 revolutions per minute.

This is such a simple proposition that any engineer or schoolboy with a pad and pencil can figure it out in a minute.

Suppose we take another case. For example, suppose that instead of pulling 300 pounds on a 9.5-inch starting crank that it pulls 100 pounds. This would be a very moderate horsepower engine, probably from 25 to 30 horsepower. Suppose that the efficiency of the motor is 30 per cent. instead of 25 per cent. This would give us 30 per cent. of the 1 horsepower when we strike the slow-down at the compression point; and 30 per cent. of 1 horsepower translated into speed at this point would be about 20 revolutions per minute or less than 1-3 horsepower. It will probably surprise many to know that the ordinary electric starter produces so little energy at the compression points, the only real work to be done. The work of turning over the crankshaft on perfectly free bearings amounts to very little.

Battery Equipment May Be Cut in Half

When the little motor and flywheel, absolutely free from all load, attain their full speed and power the current consumption is but 16 amperes and 12.5 volts, or 200 watts, or a little more than 0.25 horsepower. This means that a battery of half the weight and capacity of any that are now being used will work with perfect results.

It may be possible to incorporate this wonderful principle in a unit which will combine the starting, lighting and ignition, but it would seem to me that this would only work for possible economy in initial cost and that the final result would be much better by keeping these separate, as should trouble occur with any one of them the other two would be in perfect condition, instead of everything being out of commission together.

We believe it would be a very good thing to put a lock switch on the battery to prevent an outsider starting the motor and we have been doing this with all the outfits that we have put out.—E. V. Hartford, president, Hartford Suspension Co.

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Separate Illumination and Ignition—Wall

Indianapolis, Ind.—Editor The Automobile:—In regard to the future of the electric starter, there are so many changes and improvements constantly being made, that it is very difficult at this date to prophesy what the ultimate system will be. **My own experience has been such that I believe there is no possibility of using the same machine for both lighting and ignition and getting the best efficiency. Most engineers will agree that the magneto will give higher ignition efficiency, especially at higher speeds of the engine, than is possible with any direct-current dynamo.**

It has been the experience of our company that separate units for lighting and starting is much the better proposition, though we see no objection to these two units being combined in one case, or in any manner, provided that separate armature be used for the generator and the motor.

Chain Drive at Engine Front Advocated

In regard to the methods of coupling starting motors to the engines, quite a number of methods are now in use. The two most successful ones being through the flywheel or else through the timing gears in engine. The flywheel connection has the disadvantage of requiring shifting of pinion. The drive through the timing gears of engine has the disadvantage of putting undue strain upon these gears or chain, whichever is used; so we think a separate chain at front of engine is probably the best method.

Increasing the speed of the generators and the motors, as in everything electrical, very materially reduces the weight, so that it would look as if high-speed apparatus were the better, but the inconvenience of attaching and the large gear reduction often requires the use of slow-speed machines.

It is certainly a great help to have the battery in an accessible position, for while the battery needs very little attention, it should have regular attention. Naturally an excessive initial draw is injurious to any battery, though the pasted plate one will naturally be affected less than the Plante type. If this initial draw only lasts a few seconds, it will have very little effect on the plates of the battery, as the chemical change takes place mostly on the surface. A continued heavy draw is naturally quite injurious. The reason storage batteries have held up so well when used with electric starters is no doubt due in a great measure to the fact that after any hard pull they are immediately and continuously charged, which is not the case with batteries used on electric vehicles.—William G. Wall, chief engineer, National Motor Vehicle Co.

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Double System Is Best—Farr

Springfield, Mass.—Editor The Automobile:—Regarding electric starting and lighting systems, would say that the writer believes **the ultimate system will be a double system in which the starting motor is a separate unit from the generator, which will have combined with it an independently driving high-tension timer-distributer taking current from the storage battery and thus furnishing ignition to the motor through a step-up transformer coil.**

This, of course, will do away with the high-tension magneto, the substitute for which will, the writer believes, be eventually worked out along the lines mentioned above.

On the question of weight reduction of starting systems we believe that the high-speed starting motor having a reduction of 30 or 40 to 1 will be the ultimate motor, as the drain on the battery is greatly reduced and the ampere charging rate in the generator can be lowered, so that a direct-connected generator will be possible, doing away with the extra drive at present generally used and made necessary by the unusually high speed required of most generators.

We believe that excessive initial draw from the starting battery is injurious and that the use of a large gear reduction between the motor and the flywheel will to a great extent eliminate the danger of ruining the battery and the life of the battery will be greatly prolonged.

We have always discouraged foolish demonstrations of starting motors in their use as prime movers of a car, although in the case of necessity there is no reason why they should not be used. An instance has just been reported on one of our 60-horsepower cars, the motor of which became stalled in fording a river on account of the carbureter becoming flooded with water. The operator of the car closed the throttle to prevent water being drawn into the cylinders and successfully finished the trip on the self-starter. The speed, however, at which a car can be propelled is so very slow that we can see no reason for demonstrations of what can be done in case of an emergency.—H. C. Farr.

Trained Road Men Lacking in America

Foreign Systems Often Cited as Examples of Proper Road Methods a Failure in Many Ways, Says Col. Sohier

BOSTON, MASS., July 25—Col. William D. Sohier, chairman of the Massachusetts Highway Commission, has recently returned from London, where he went as a delegate to the International Good Roads Congress. Following the convention he traveled some 2,000 miles over the roads of France and Great Britain in his automobile and made a thorough first-hand inspection of what is being done across the water to improve highways. He has collected a lot of data and some he will submit to the Good Roads Congress to be held in Detroit, Mich., in September. From what he saw on the other side, he was able to make comparisons with work being done here. The maintenance problem has not been solved by European experts, and traffic conditions are as bad over there as they are in this country, he believes.

"Generally speaking, the roads of Great Britain and France are no better than the best built roads in this country," said Col. Sohier. "But over there they have practically no poor roads. Nearly every road is of macadam, gravel being very little used. In maintenance, also, England and France are ahead of the United States, not in methods, but because they spend fully three times as much money per mile and their labor is cheaper.

"The great road and motor vehicle problem abroad at the present time is the maintenance of a highway to withstand the exceedingly heavy traffic of freight-carrying vehicles. All the larger cities of England, but more especially London, have their streets filled with heavy motorbuses carrying twenty-five or more people, and in the streets and the outlying roads there are great numbers of steam lorries. These lorries carry about 5 tons each and usually have two trailers, each carrying a 5-ton load. They have iron tires, the rubber-tired truck which is common in American cities being little in evidence.

"In Paris it is practically recognized that macadam is not strong enough to withstand heavy traffic. The Bois de Boulogne is full of pot-holes where there is a macadam surface, as are some of the much-used roads around Boston. Paris is adopting wooden blocks for city streets, placing them on a concrete base, and for 10 miles out of the city in almost every direction there are such pavements, which appear to be wearing very well. In London also this sort of pavement is now being used, with a tar surface over it, and it has not worn to any extent."

French Road System a Failure

The French system of road maintenance, that is often cited here as being a thoroughly reliable one, and an example for this country, and which New Hampshire has just adopted—that of having road patrolmen patching small holes continually from piles of rock along the way—seems to have failed. Col. Sohier says he noticed that the patrolmen were engaged in cutting the grass and cleaning the gutters, but that where surface work was in progress it was being done with gangs of men with steam rollers as has been the custom in this country for a long time. The French national roads have a 24-foot surface, 5 feet of grass and 3 feet of gutter on each side. The district roads have 18-foot surface and the country roads of minor character 15 feet of surface. State roads in Massachusetts are of 15- and 18-foot surface.

England has tried an interesting experiment that seems to be working well in surfacing roads with iron slag instead of stone. This slag, about the same size as 2.5-inch stone, is prepared with a coating of tar before being applied and then rolled down. It packs well and then makes a smooth, durable surface. The slag comes from the iron centers and as there are great quantities of it available in certain parts of the United States, the experiment in England is likely to be valuable to those states where it may be had cheaply.

All through England and France the road builders are using tar almost exclusively on the road surfaces. Where a stone top is used the stones are generally of a good size and packed with tar. The English tar seems to keep its life better than that in this country, some pieces of road that Col. Sohier saw having been down from 5 to 10 years. England has about 40,000 miles of tarred roads and about 4,000 miles of tar macadam.

What England Is Doing

Col. Sohier cites as an example of what is being done in England in road maintenance the case of Lancashire, where a man named Schofield has charge of 623 miles of highways, main roads, too, and has available for maintenance and reconstruction $1,500 per mile per year. Massachusetts, as an average state, spends about $500 per mile per year. In Liverpool they have an interesting method of handling street work. The man who is at the head of the street department has complete charge of everything in, over and under the streets. If street-car rails are to be laid he does the work. If a pipe is to be repaired or relaid he digs the trench, makes the repairs and replaces the surface. The same method prevails as to wires. There is in England one piece of Belgian block pavement on a concrete base put down 41 years ago and numerous pieces more than 30 years old that are in good condition. In Paris the sewers are maintained from inside and carry other pipes.

In France much attention has been given to easy grades and to wide corners, but in England some of the corners are very sharp and blind. Work is in progress, however, in England toward eliminating these dangerous spots. There is a 20-mile speed limit all over England for motor vehicles and it is very generally complied with. A chauffeur may be fined as high as $75 for a first offense and $100 for a second offense.

Throughout the United States, where roads are being improved, there is felt the dearth of trained road engineers; they are very few and the schools do not seem to be turning them out. France, on the other hand, recognizes road building as practically a separate profession. To be an engineer in France a young man has to spent 7 years in study before he is even eligible to take an under position about like that of a road supervisor here, and then he must spend at least 2 or 3 years on the road in actual work before he may get his degree as engineer. This makes him both a practical and technical man, for he must continue his studies while at work and pass an examination before he is promoted.

In the matter of motor car accidents: they do not seem to be handling them any better, perhaps not as well as they are handled here. London's traffic is very dense and last year there were 537 people killed and 20,000 injured by street accidents alone in that city. Traffic is obliged to move rapidly when it can, and there is practically no speed limit except that enforced by traffic. At Hyde Park corner in London 10,000 vehicles an hour pass and the traffic policemen there make them start rapidly and drive quickly, else there would be a continual blockade. In the Strand there is three times the traffic that there was a few years ago, and under 10 per cent. of the horses.

The Use of Truck Routes

Need of Standard Routes, Their Selection and Modification—Time Standards in City Delivery Work

IN truck installations, such as are maintained by the large stores of our principal cities, the question of getting maximum work out of each truck is an important problem, the solution of which must be approached from every angle, and although there always remains room for improvement, it is possible to constantly progress in economy and efficiency. Competent handling of the truck, from the mechanical side, is one phase of this situation. The other consists in the delivery work proper, which is a commercial proposition throughout, and the efficiency of which depends on the three factors: Speed, reliability and security. All of these are more or less dependent on the nature and quality of the truck and its driver. But, aside from these, other factors enter into the delivery problem, as will be shown presently.

Suppose that a very excellent 5-ton truck, driven by a first-rate man who is assisted by an expert helper, travels along a country road which has lately been repaired. One side of the road drops toward a field, the banking being of sand. Suppose the road is 15 feet wide. Of course, the driver will keep his truck on the crown of the road, if such there is, or, at any rate, in the middle. But if he meets a truck coming in the opposite direction he will have to keep to one side, and if he will get close enough to the newly settled edge, the latter is apt to give way, the truck slides down off the road and will have to wait a half day or even a whole day before it can be put back. The consequences of such a happening are:

1—Loss of time on the part of truck, driver and helper, and reduction of their operating efficiency;

2—Cost of putting the truck back on the road;

3—Possible cost of repairs necessitated by damage incurred by the accident;

4—Dissatisfaction of customers on account of delayed delivery.

In city delivery, the problem of selecting the best route has a different countenance. But here, too, are traffic hindrances of all sorts, and the problem stands as before, to deliver the goods, over the shortest possible distance, in the shortest possible time, using a hard, well-paved street which produces as little as possible of vibration, which is wide enough to afford speedy passage of the truck most of the time and which is not so crowded as to nullify the advantage growing out of the width.

In the large American cities, traffic is "bunched" together, the majority of pedestrians and vehicles move along a few arteries of commerce called avenues and streets, and the remainder of passageways, often more suitably constructed, remain relatively empty, although they could well serve to reduce the congestion. On the other hand, the avenues and streets used mostly are generally kept in better condition than those less traveled. In each case, that is to say, each city, conditions are different and the man whose business includes motor delivery by means of a number of trucks will do well to make a thorough study of these conditions and to adapt his delivery routing system, schedule and methods to them.

In order to do this, let us take the example of New York City, more especially Manhattan and Harlem. The important department stores, whose delivery problems are more intricate than those of any other business, are all disposed practically, along three lines which run from south to north: Broadway, Fifth avenue and Sixth avenue. The most important and busiest section is that around the part of Broadway between the latter's intersections with the two avenues named. This section lies between Twenty-third and Thirty-fourth streets on one hand, and Fifth and Sixth avenues on the other. There is a slight tendency for east and westward expansion, the first being more pronounced, but the department stores cling pretty well to the zone just described.

At present the stores disposed along Broadway and Sixth avenue from Twenty-third to Thirty-fourth street use these two lines as principal tracks for their trucks. Where cross-town service is required, the two streets named take almost the entire load of the traffic, except if deliveries are to be made in intermediate streets which could be loaded much more heavily.

Any changes to be made in the delivery routes must be introduced only after a careful study of all the highways available.

A delivery superintendent wishing to modify the route system of his deliveries will base his intentions on the following facts and arguments:

1—By using a less heavily laden highway, trucks will make better headway, save time in delivering the goods and avoid many chances of accident.

2—The consequence will be increased working capacity of the

ROUTE No. 27. JOHN SMITH & COMPANY New York Route Adopted April 3, 1912.

Store to Crotona Park & Boston Rd.

Modified

August 12, 1912: s. 27 a.
December 5, 1912: s. 27 b.
February 2, 1913: s. 27 e.

To Broadway & 36th	1:00 Min.
Through 36th to 4th avenue	2:00 "
Up, to 42nd	1:00 "
Right hand, to Lex. ave	:30 "
Up, Lex. ave. to 130th	23:00 "
Across to 3rd avenue (Includes crossing of bridge)	4:30 "
Up, 3rd ave. to Boston Rd	2:36 "
Up, Boston Road to Crotona Park	2:40 "
Total	37:16 Min.

Side routes, s. 27 c.
Description of route (nature, etc.*1/3/13/)s.27d.

Fig. 1—Sample sheet from the route book, giving a delivery route as first outlined. Attached to this sheet are the route modification records

trucks and a decreased delivery expense per package. This is what counts in store delivery.

3—The prompter delivery will tend to increase the company's business.

Having decided to adapt the route system to up-to-the-minute requirements, the delivery superintendent will have to take a ride with each truck over the route at present covered. He will have to keep his eyes open with regard to the traffic on the highways used and those which could be used; he will have to watch the pavement and, out of the city, the roadbeds and their condition; he will have to look out for possible short cuts. Taken altogether, what he will have to look out for is the shortest possible line of good road with the least traffic upon it. A good man and delivery expert will be able to improve a route after one trip. A less adept man will perhaps have to repeat the performance.

Having laid out a trip for a driver, the latter must be given orders to report to the delivery superintendent at once, when a road repair or similar circumstance makes it impossible for him to follow the assigned route. If this happens, the superintendent will have to send his assistant with the driver to lay out the next best route. In no case should it be left to the driver to select or modify his route. If he follows strict instructions, it will be possible after say 2 months of operation to tell approximately how much time is needed to cover the route with twenty-five, fifty or sixty deliveries and driver and truck will be used to their best capacities. Besides it would be possible to catch the driver at any time, by sending someone after the truck, if the running schedule of the same is known to the superintendent.

In order to have still more exact records of the work of the delivery trucks, a delivery blank such as shown in Fig. 2 is advisable for use. By having the driver record the hour and minute of each delivery, not only is this fact recorded in the case of a dispute between the store and a customer, but it also gives the truck superintendent an opportunity to see whether the drivers work efficiently and up to the standard of speed which can reasonably be expected.

Each route should be kept in the office outlined on a leaf, Fig. 1, typewritten and signed with the superintendent's name. The date when the route was laid out, and the dates of introducing and abandoning any modifications of the route should also be given. All route leaves of the same number—which cover about the same territory—should be kept together, in the order of the date, the most recent route outline being kept on top and

JOHN SMITH & COMPANY
New York

Date________________19___.

Truck No. _____.

Trip No.____, Start__________, Return__________.

Trip No.____, Start__________, Return__________.

Trip No.____, Start__________, Return__________.

Trip No.	Address	Received	Time	Remarks

Driver__________________. Times transferred by

Helper__________________. ________________ Clerk.

Fig. 2—Delivery time record and receipt blank

secured to the other or auxiliary leaves by means of metal clips.

All the delivery receipts, after having been turned into the office in the morning, should go to a clerk who goes over them and copies the starting and stopping time of each trip, as well as the locality and time of each delivery. By continuing this work for 2 or 3 months, and keeping together all records referring to one route covered by the same truck, the superintendent's department is placed in possession of valuable information. From these records may be deduced average, maximum and minimum times for covering certain stretches of route and also the average times for deliveries in certan neighborhoods. If, later on, it is desired to experiment with a modification of a route, all that is necessary is that the superintendent lay out a new route and send the driver over it for 3 or 4 days in succession, with the order of beating the maximum time. If necessary, the assistant superintendent will have to accompany him. It soon will then develop whether the proposed route is an advantage or disadvantage over the one in use.

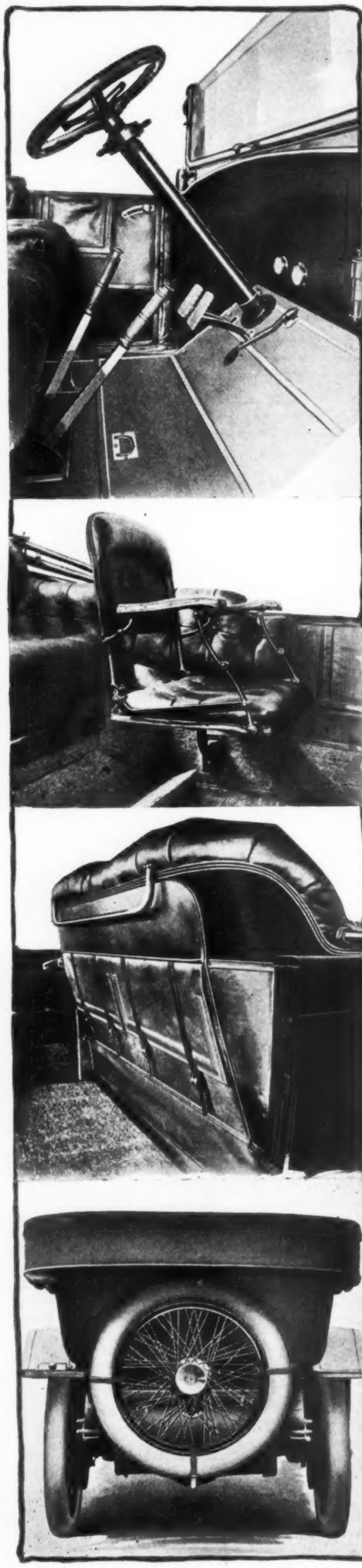
Truck No. 5, covered Route 18 from Sept. 9 -'12 to Febr. 17 -'13.

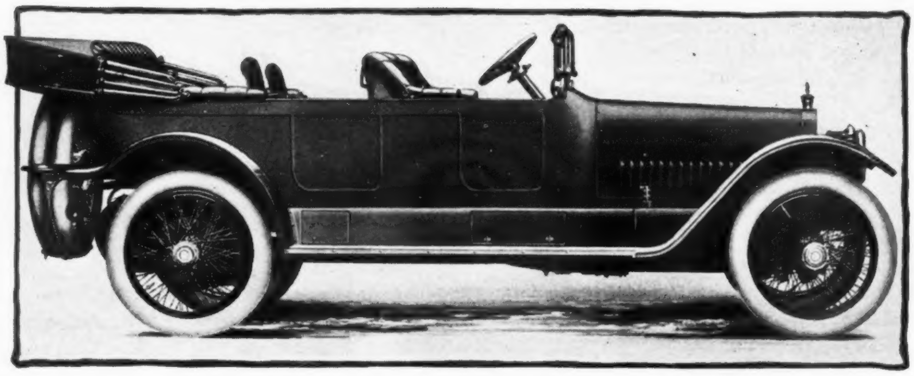
average, 2 trips a day
capacity, 1.5 ton
Time & Del. Record,
first two weeks

	(Dels)	H:M				RESULTS:
Sept. 9	22	2:36	Sept.16	16	2:61	
do	17	2:05	do	25	2:55	First Week:
Sept.10	28	3:29	Sept.17	30	3:51	Dels....257
do	25	2:45	do	21	2:28	Hrs...30:55
Sept.11	15	2:00	Sept.18	18	2:13	dph....8.31
do	15	2:19	do	21	2:57	dpd....42.88
Sept.12	26	2:51	Sept.19	29	3:46	dpt....21.4
do	30	3:15	do	15	1:52	Second Week:
Sept.13	21	2:30	Sept.20	17	2:07	Dels....254
do	25	2:46	do	19	2:42	Hrs...32:16
Sept.14	10	1:50	Sept.21	27	3:15	dph....7.90
do	23	2:29	do	16	1:49	dpd...42.33
Total	257	30:55	Total	254	32:16	dpt...21.16

dph = deliveries per hour; dpd = deliveries per day; dpt = del. per trip

Fig. 2—Delivery-time records of one truck for 2 weeks. These records are kept during the first 2 or 3 months after a route has been selected for use





1914 Stearns-Knight six-cylinder seven-passenger touring car equipped with wire wheels

Stearns Adopts Left Drive and Center Control

Sloped Hood and Straight-Line Body Effect—Wire Wheels are Optional—Transmission on Four Now Amidships

Switch, Carbureter Adjustment, Lights and Horn Control Are Centralized on Steering Column

IN placing its new 1914 models before the public, the F. B. Stearns Co. of Cleveland lifts the curtain on a number of new improvements and announces its championship of many changes gradually affecting the entire industry.

Notable among these are the adoption of left drive with center control, optional wire wheel equipment, steering-column control, and the tapering hood and cowl.

These changes include both the four- and six-cylinder models, whether touring cars, runabouts or closed models.

One of the most noticeable mechanical advances is the steering-column control. Instead of the customary arrangement, the principle of centralizing the control under the operator's hand has been carried out by a system of small rods operating in the casing surrounding the steering column proper. These rods or levers are operated by 1-inch levers located just under the steering wheel, while the lights are controlled by the customary pull-and-push buttons also carried just under the wheel. The switch, carbureter adjustment, lights and Klaxon horn controls all center, so that there is a minimum of effort employed to operate them. The self-starter is operated by pedal. The new Stearns models offer the largest variety of any season's output. Four-, five-, six- and seven-passenger touring car bodies are mounted on either the four- or six-cylinder chassis, and the same applies to the new three-passenger roadsters, limousines and landaulets. In addition, there are two new models, a coupe and sedan, to be built on either the four- or six-cylinder chassis. Taking into consideration the fact that altogether the Stearns factory is building four chassis types—two wheelbase lengths in both the four- and six-cylinder models—it is quickly seen that the new Stearns line is most complete in every detail. There has been practically no noteworthy change in the motor in either the four- or six-cylinder model. The motor sizes remain the same as last season, namely, 4.25 inches bore by 5.5 inches stroke in the four-cylinder product and 4.25 by 5.75 inches in the six.

In the six-cylinder the chassis remains practically the same as last year so far as basic ideas are concerned, but in the four-cylinder type the transmission has been moved forward from the rear axle to amidships. This change in no way affects the well-known rear axle construction which has been a feature of the Stearns product for a great many years, and which is admitted to be about the strongest construction

Top—Control features of the new Stearns, showing centrally located levers and steering-column control

Upper middle—Well upholstered folding seat of arm chair pattern for extra tonneau accommodation

Lower middle—Rear of front seats, showing neat appearance of spacious strapped pockets and hinged rug rail

Bottom—The spare wheels are carried firmly in a three-point bracket at the rear

which it is possible to use. This consists of a solid forging extending from one rear wheel to the other, being split in the middle to carry the bevel and pinion and differential gears, and being bored from the center to the ends to carry the floating drive shafts.

Probably the most noticeable feature of the new series of Stearns models, however, is found in the adoption of the sloping hood, referred to above, with the combination of straight line body.

Many Body Improvements

A great many body improvements have marked the first of the new 1914 models. Two tool boxes have been placed under the body proper, and are easily accessible, the covers being located just over the running board under the front seats. The folding arm chair type of tonneau seat has been adopted in all seven-passenger models. This seat easily and quickly folds out of the way, takes up but little room and is the most comfortable of all tonneau chairs.

The upholstering of all models has been carried out with great care and attention to detail, comfort and style being the aims of the builders. The deep upholstery is continued.

Silk mohair has been discontinued as the standard top material in favor of Pantasote, while a special quickly operated top has been designed for the three-, four- and six-passenger models on both the four- and six-cylinder chasses.

The Gray & Davis electric starting and lighting system is continued on all models, while the idea of modern electrification has been carried another step forward by the elimination of the bulb horn, which in the opinion of the Stearns people no longer has a place on the up-to-date car. The Klaxon button is placed on top of the projection of the steering column, further carrying out the idea of centralized steering-column control.

Goby Motor Has Slide Valves

CLEVELAND, O., July 26—The Goby Engine Co., of Cleveland, has just placed on the market a perfected slide-valve engine in which the sleeve valve is placed in such a way that it is protected from the heat of the explosion. The motor is characterized by a single sliding valve member which reciprocates in a chamber placed transversely of the cylinder. The protection of the valve from the effects of the heat of combustion results from its slight elevation above the combustion chamber and from the fact that it is water-jacketed. Movement is imparted to it from a horizontal shaft mounted on the side of the engine and running its length.

Front-Wheel Driven Automobiles Safe on Racetrack

Recent Columbus Accident Not Due to Car, Which Threw No Tire, Says Owner

COLUMBUS, O., July 26—Editor THE AUTOMOBILE:—On July 4 the Columbus Automobile Club held a race meet, during which Harry C. Knight was killed when his car skidded and overturned. The car which he was driving was a front-driven car. The skidding of this car was caused by pulling of the gear into neutral and setting of the emergency brake, which brought about the fatal consequences.

The tire of the right rear wheel of the Kinnear car did not blow off, as was mentioned in your report, but was on the wheel after the car had turned over and the operators had been killed. The fact of the matter was that there was a slow leak in the tire, which bore indications of rim cutting; this would seem to be a sign that Knight went twice around the track on a flat tire.

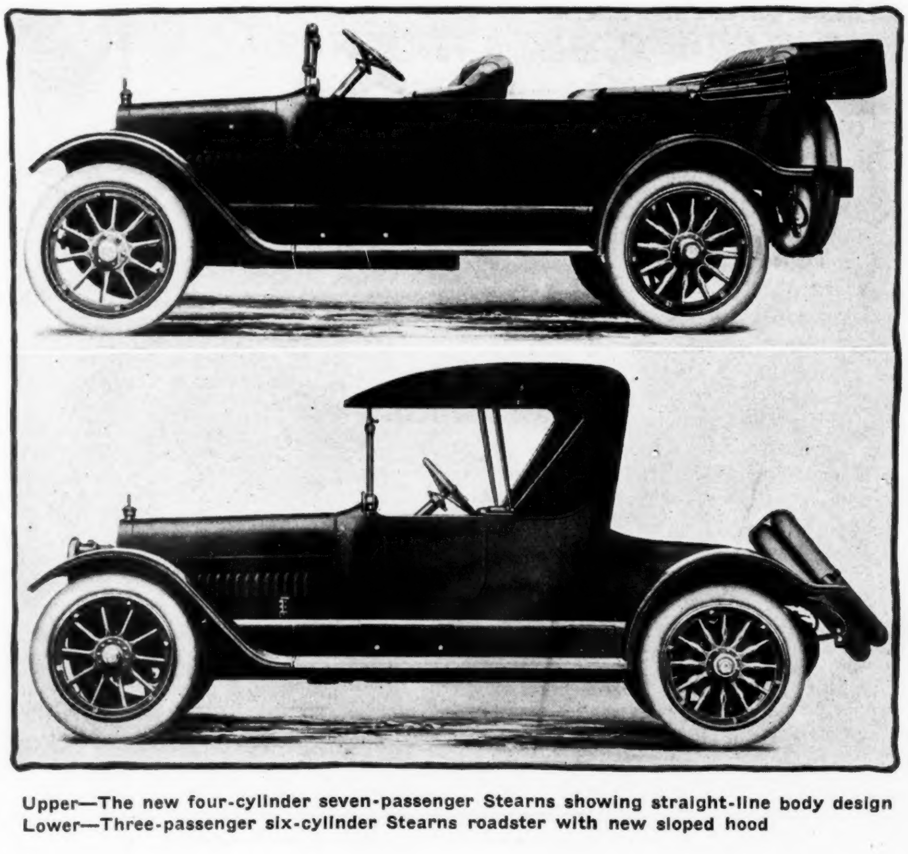
The principal cause of Knight's accident was undoubtedly his unfamiliarity with the peculiar mechanism of the front-wheel driven car. A flat tire on the rear wheel of such a car would not have been by far such a source of danger as in the case of a rear-wheel drive, but Knight, not knowing this, when he was informed by the mechanician that they were running on a flat rear tire, became wide awake to the apparent danger of such a procedure and consequently brought his car to an abrupt stop, or rather tried to do so, thereby giving direct cause to the deplorable happening.

The Kinnear was not a racing car, but the writer's personal touring car, which he had run for over 8,000 miles on one set of tires, without ever applying chains to the drive wheels in the worst kind of mud imaginable, with the most encouraging results.

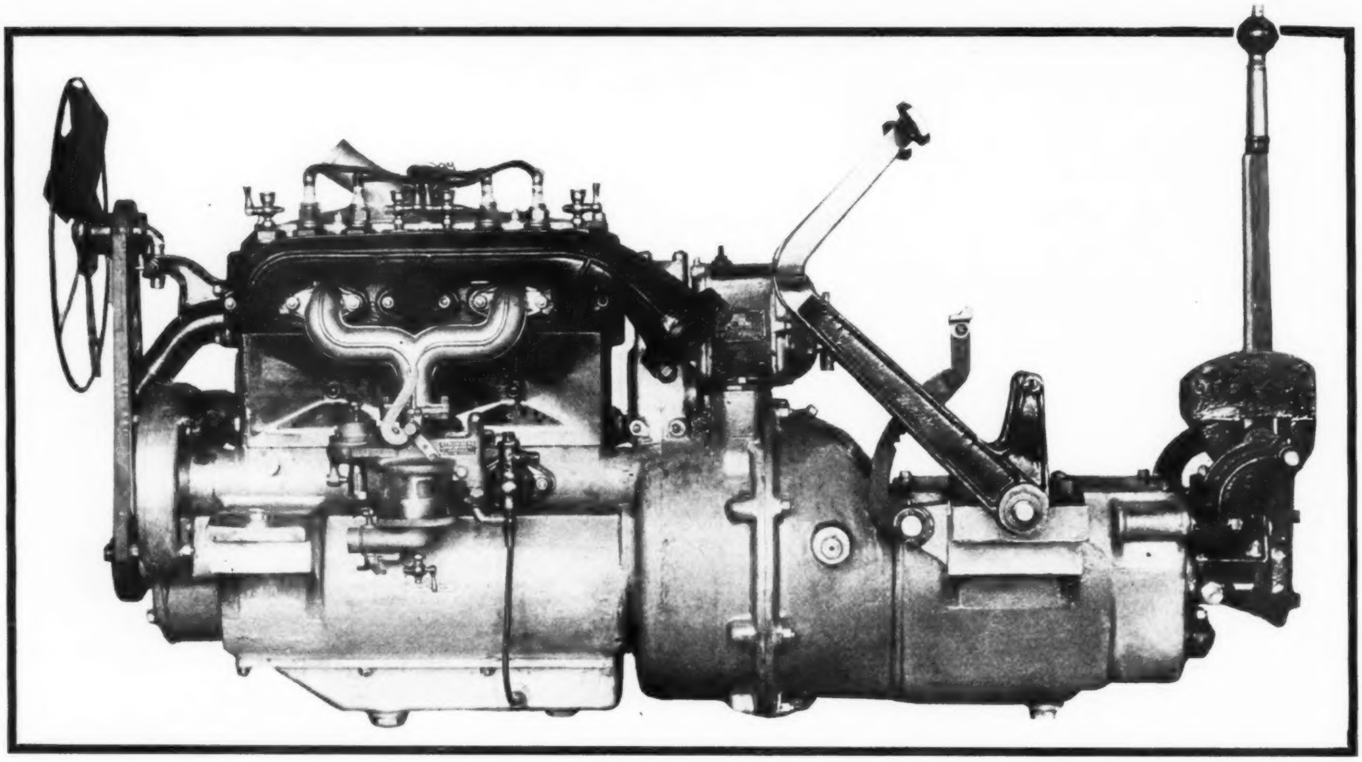
The suspension of this car is one of its notable features. Instead of the usual form of leaf spring for the front axle, double sets of flat-leafed springs are used, rigidly fixed to the frame at the rear and shackled in front above and below the axle casing.

It is claimed that this car cannot skid as long as there is power applied, but if the power is taken off from the driving wheels, it is no more front-wheel drive than it is rear-wheel drive—it becomes a mass flying through space rolling on wheels, of which the guiding wheels assume the office of altering the course of the mass in motion.

R. H. ROSERBEROFF.



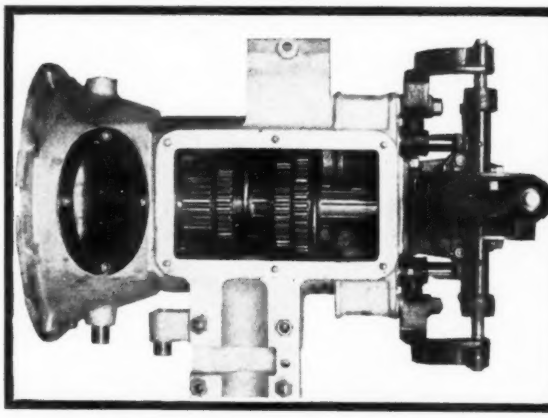
Upper—The new four-cylinder seven-passenger Stearns showing straight-line body design
Lower—Three-passenger six-cylinder Stearns roadster with new sloped hood



Left side of new Herreshoff four-cylinder motor, showing unit construction and mounting of Westinghouse generator

New Herreshoffs Use Three-Unit Electric System

Westinghouse Starting, Lighting and Ignition System a Feature—Four and Six-Cylinder Models Continued for 1914 Season



Top view of the unit clutch and gearbox

FOR the 1914 season the Herreshoff Motor Co., Detroit, Mich., offers two models of chassis—a four and a six-cylinder type—on which are fitted a variety of body styles. Last year the concern added the small six to its line, and this, in addition to its four-cylinder model, are continued with some refinements plus a full electrical equipment for cranking, lighting and ignition.

Save for the application of the three-unit Westinghouse electrical system, the motors show no noticeable changes in design or arrangement of essentials. They are both 3⅜ inches bore and 4.5 stroke, and are rated at 40 and 30 horsepower for the six and the four respectively. Although the six is a T-head type, while the four-cylinder is an L-head design, the same general characteristics of construction are in evidence on each. Differences due to manifold arrangements occasioned by the different cylinder castings are, of course, necessary, but as to crankcase construction, method of attaching the gearboxes for the unit power plant feature, and so on, show that the same designer made them both.

The cylinders are cast in block in both cases. To avoid confusion, we will consider the larger power plant alone and those points wherein the four differs from its larger brother will be pointed out.

This six power plant is really one of the smallest on the market. Its cylinder dimensions give it a stroke-bore ratio of 1.33 to 1, putting it in the long stroke field. The exhaust valves are located on the right side, while the intakes occupy the left. To economize space, the valve pockets are set diagonally, converging as they run into the cylinder heads. Valves and springs are completely inclosed by easily-removable cover plates, two to a side.

Both camshafts and crankshaft are mounted on three plain bearings each, making a rigid construction in this respect. These bearings are all of a special white metal. The various dimensions of the six motor follow:

Crankshaft bearings—Front, 1½ by 2 inches; center, 2 3/16 by 3 inches; rear, 1½ by 3½ inches.
Camshaft bearings—Front, ⅞ by 3 inches; center ⅞ by 2¼ inches; rear, ⅞ by 2 inches.
The first dimension in each case applies to the diameter.
Connecting rod bearings—Lower, 1 11/16 by 2⅛ inches.
Wrist pin bearings—¾ by 1⅝ inches.
Pistons—Length, 3¼ inches; provided with 3 eccentric rings each.
Valves—Diameter, 1⅜ inch; lift, 5/16 inch.
Thickness water jacket space—⅝ inch.
Thickness jacket wall—3/16 inch.

Timing gears are placed forward and inclosed in the conventional way. Cooling is by thermo syphon and is augmented by large water outlet and inlet headers and a large fan at the front of the motor. The water jacket space communicates around all six cylinders, due to the block casting. Inlet and exhaust manifolding are made as simple as possible. There are two main connections to the casting from the inlet pipe, while an equal number convey the burnt gases away.

The crankcase extends back to inclose the flywheel and has a flange at its rear end to which a mating flange of the gear

case bolts. The lower part of the crankcase is removable for inspection of bearings, cleaning out and the like.

The lubrication is of the splash type, having an independent well under each connecting-rod. The oil is fed into these wells by a mechanical pump which draws from a reservoir in the bottom of the crankcase. The wells overflow into this reservoir and after filtering the oil is forced to a sight feed on the dash and then back to the wells.

The Stromberg carbureter is continued on all models. The fuel is fed to it by gravity, the gasoline tank being placed under the front seat in the touring car models and back of the seat in the roadsters. There is an auxiliary air valve provided with two adjustments and a shut-off valve in the primary air tube, which is closed for starting, thus sending a rich mixture to the cylinders.

The cranking motor is located on a base cast integral with the upper part of the flywheel housing, and its gearing to the flywheel is enclosed. There is a large reduction between the motor and flywheel. The generator is mounted on a bracket which is a part of the crankcase on the right side forward, next to the timing gears.

To operate the cranking device it is only necessary to press down upon the starting pedal in the car. The switch has two points, the first movement of the pedal causing the electric motor to turn over very slowly to facilitate engagement of the gears connecting with the flywheel and further depression of the pedal causing the motor to revolve much faster and spin the engine. Pressing down on this pedal engages the gears as well as making the electrical contact to the electric motor.

The location of the electrical units and their workings are identical with the four and six-cylinder power plants.

Like the pistons, connecting-rods, valves, and so on, the clutch and gearset are identical for both four and six-cylinder models. The gears provide four forward speeds and reverse, and together with the dry plate clutch are housed in an aluminum casing which bolts to the flywheel housing flange. On the six the clutch has twenty-four plates, while there are four less in the four-cylinder models. The gearshift is in the center, while the drive is on the left, making for the most convenient position for these members relative to one another.

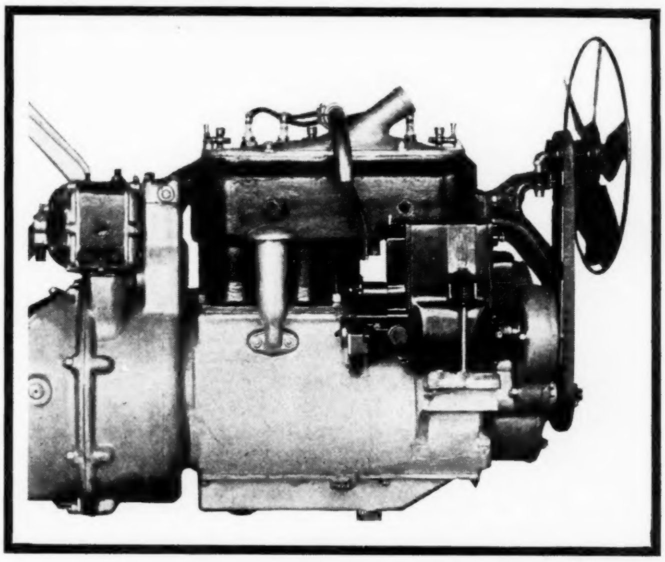
The propeller shaft is inclosed in a torque tube, which bolts to the semi-floating rear axle through the conventional flange construction. Radius rods run from a point half way back on this tube to the ends of the rear axle. The axle shafts are of chrome nickel steel, while the usual complement of external contracting and internal expanding hub brakes acting on drums are to be found.

However, the rear spring suspension differs on the four and six. The latter has a platform suspension, there being a half-elliptic spring at either side and outside the frame, while a rear cross-spring connects to the ends of these through shackles. This rear cross-spring fastens to the end of the frame at the center. On the four the rear springs are half-elliptic, shackling to spring horns at their rear ends.

The wheelbase of the six is 124 inches, while the four-cylinder touring car has a 110-inch length between wheel centers, the roadster four being 10 inches less.

In addition to the equipment already mentioned, the new Herreshoffs appear with demountable rims with one extra rim, electric lamps all around, electric horn, tire pump, windshield, speedometer, and other apparatus which is now almost regarded as a necessary part of the car.

The bodies are very attractive and appear in royal blue painting with the exception of the running gear, which is black. Nickel and black enamel are in evidence on all metal parts.



Right side of new Herreshoff four-cylinder motor

Three-quarter view of four-cylinder, five-passenger Herreshoff touring car for 1914

The Rostrum

In which Letters from Readers Are Answered and Discussed

Spark Must Be Kept Advanced on Hills

Ignition as Early As Possible on Hills as Well as Level Best Rule—Use of Accelerometer

EDITOR THE AUTOMOBILE:—Please answer the following: In taking hills on low do you get more power by retarding the spark as much as possible, or do you have to keep the spark and throttle balanced according to the speed of motor? Is it better to take the hills on magneto or battery, engine running at a good rate of speed?

Macon, Miss. N. H. HARRISON.

—In running up hill as well as on level ground there is but one rule for the government of the spark and that is to keep it advanced as far as possible. The further advanced you keep the spark, provided, of course, that it is not causing a knock, the higher efficiency you are getting out of your motor and the less chance you stand of heating the motor above the boiling point of the water.

It is just as satisfactory to take the hills on the magneto as on the battery if your magneto is in good condition and if the motor is running rapidly. If the motor is barely turning over you would probably secure a better spark on the batteries unless your magneto is designed especially for furnishing a hot spark at full retard and when running slowly. In general, the gain secured by switching over to the battery will never be noticed. When it is there is something wrong with the magneto.

Tester Uses Accelerometer on Trucks

Editor THE AUTOMOBILE:—The accelerometer has been described in THE AUTOMOBILE and it is sufficient to point out one characteristic that distinguishes the Wimperis from other accelerometers—the very thorough way in which the oscillations of the needle are damped. This makes the instrument valuable in the hands of car testers.

It must, first of all, be distinctly understood that it will not measure volocity. It has no connection whatsoever with the speedometer. In fact, it can be used almost entirely without the use of a speedometer. All that is really necessary is a stop watch, though this also can be eliminated. In simple practice, it is, however, advisable to use both stop watch and speedometer.

Acceleration is the rate of change of velocity. If, for instance, the velocity of a car is 20 feet per second, and at the end of one second the velocity has changed to 25 feet per second, the change of velocity is 5 feet per second in 1 second. The acceleration is then said to be 5 feet per second per second. This final per second is confusing, but if looked at this way, the difficulty some people have in understanding this may disappear.

For smoothness of acceleration a car should not be allowed to exceed a rate of change of velocity of more than 1 foot per second per second. This would give a speed of 41 miles per hour in 1 minute. Of course, people have become habituated to a bigger acceleration and up to 2 to 3 feet per second per second can be stood with comfort.

This instrument does not measure velocity. It measures only acceleration, whether positive or negative. It will help to a better understanding if the idea is firmly fixed in the mind that it actually measures the tractive effort at the wheel, or the tractive resistance.

This is derived from the simple statement

$$F = \frac{m\alpha}{g}$$

where F is the force in pounds at the wheel circumference; or, in other words, the tractive effort.

m is the weight of the car in pounds.

x is the acceleration in feet per second per second.

g is the gravity acceleration 32.2 feet per second per second.

This simple formula illustrates the first important use of this instrument.

A 5-ton truck was made to travel at various constant speeds to overcome starting inertia and "stiction" interference. The throttle was then opened wide, and the maximum acceleration reached noted. This can be taken as representing the maximum force exerted owing to the very fine damping of the needle.

The truck weighed 19,500 pounds.

On low gear, maximum acceleration was 4.1 feet per second per second.

$$F = \frac{19{,}500 \times 4.1}{32.2} = 2485 \text{ pounds}$$

This was tractive effort at circumference of wheel during this test accelerating the truck.

At a radius of 20-inch wheel, this represents a torque of 49,700 —say 50,000 in pounds on axle.

In addition to this force accelerating the truck, there is also a force keeping it traveling at a constant speed. This is really the road or rolling resistance.

This is measured by letting the truck travel at a definite speed, then throwing out the clutch and reading off the retardation or negative acceleration.

On the Wimperis scale this is read off directly in pounds per ton of 2,240 pounds.

On the truck, during this series of tests, this was found to be one low gear, approximately 30 pounds per ton, or a total of

$$\frac{30 \times 19{,}500}{2{,}240} \text{ or } 260 \text{ pounds.}$$

This at a radius of 20 inches gives 5,200 inch pounds torque keeping the truck traveling at low gear.

There is a further power absorption due to deformation of the tires when power is applied, but I think the absorption on solid tires with heavy truck under heavy load is probably much less than with pneumatics. Assume, say, 5 per cent. of the engine load.

We have, therefore, an additional torque of the following:

5 per cent. (50,000 + 5,200) = 2,760 inch pounds.

There is thus a total torque delivered to rear wheels of

50,000 + 5,200 + 2,760 inch pounds = 57,960 inch pounds.

Now the actual engine torque delivered at rear wheels, assuming an efficiency of 100 per cent., is 86,500 inch pounds through these gears 3.77 and 7.8. This gives efficiency of truck on low gear of

$$\frac{58 \times 100}{86.5} \text{ per cent} = 67 \text{ per cent.}$$

Similarly, the maximum acceleration reading on second gear was 2.4 feet per second per second which gave a torque on rear wheels of 29,200 inch pounds. This also had a retardation of 30 pounds per ton or retarding torque of 5,200 inch pounds and the allowance as before gives us total torque on rear wheels of

29,200 + 5,200 + 2,210 = 36,610 inch pounds.

Actual torque due to motor assuming 100 per cent. efficiency on the second gear is 50,000 inch pounds.

The efficiency of the truck on this gear is, therefore,

$$\frac{36.6 \times 100}{50} \text{ per cent.} = 73.5 \text{ per cent.}$$

On high gear, or direct drive, the maximum acceleration reached was 1.2 feet per second per second, which gives a torque of 14,600 inch pounds on wheels. Coasting resistance was 20 pounds per ton for this gear, or a torque of 3,480 inch pounds on wheels, plus 5 per cent. for tires as before = 1,084 inch pounds. Total torque on wheels is then 19,164 inch pounds.

Torque, assuming 100 per cent. efficiency on wheels, is 22,900 inch pounds.

Giving an efficiency of truck on direct drive of

$$\frac{19.2 \times 100}{22.9} \text{ per cent.} = 84 \text{ per cent.}$$

While the above efficiencies necessitate some calculations, I believe that, for ordinary testing purposes, merely noting the acceleration and retardation is sufficient.

This experiment at once indicates a great value for this instrument, as a definite standard of acceleration and retardation could be set for each car and the testers instructed to tune their cars till this standard was reached.

A criticism can be made, however, that acceleration is influenced by two factors. The carbureter and the mechanism contribute both to the total acceleration, and an ignorant tester may proceed to tune up his carbureter while the chassis is the real cause of poor acceleration.

When the truck was run up to a speed of 14 miles per hour and the clutch thrown out, a retardation of 20 pounds per gross ton to 15 pounds was shown on the scale. Now if this chassis had a dragging brake or similar frictional loss, this retardation would have been very much greater. Therefore, if the acceleration is poor and the retardation down to the standard allowed, the fault lies clearly in the motor, probably the carbureter. Vice versa, transmission faults can be looked for.

That this is no idle suggestion is shown by recent experience when much time was spent during test tuning up engine, carbureter and ignition, searching for a supposed loss of power in a truck. Eventually a dragging brake was found to be the cause. The use of the accelerometer would have discovered this very quickly.

I wish to enlarge on this aspect very strongly as it is in this direction that the chief use of the accelerometer lies.

First, out of a number of carefully selected, tuned-up cars, establish a standard of accelerations on all gears. Establish standards of retardation with the motor in and ignition shut off and with the motor thrown out. With the brakes on partially, with or without top, windscreen, etc., or any other variations that may suggest themselves. With these standards, an old car, or a newly assembled car can be at once compared and discrepancies found.

It would seem to me to be an efficient substitute for the bench dynamometer, inasmuch as it also eliminates the personal element. Motors are at present tried out on the bench, likewise transmissions and rear axles. Adopting the maxim, that if the test is right there, it is reasonable to assume it will be right on the road, there alone remains a brief test to see if the parts are co-ordinated properly.

There is one detail of this instrument that is hard to understand simply because the instructions are loosely worded. It is noted, for instance, that the instrument will read acceleration correctly if the car be on a grade or not. This is in a sense true but this does not mean that the car is actually accelerating up the grade. What the instrument does is to measure tractive effort or retardation indiscriminately of whether a grade is encountered or not.

Thus, if the grade with the car stationary shows a reading on the scale corresponding to 3 feet per second per second then the acceleration will show a reading of 3 feet per second per second when the car is moving with uniform velocity up this grade. The motor is exercising a tractive effort which, on the level, would accelerate the car at 3 feet per second per second. Similarly with the retardation.

The essential is that the instrument should read zero when the car is on perfectly level ground. This is best accomplished by facing the car one way, reading the instrument, then turning the car right around and adjusting to split the difference.

Having thus described the principal uses of the accelerometer, few of its special uses may be briefly run over.

It is useful in analyzing the personal element entering into the change of gear. This is best shown in the diagram herewith, where the effect of each speed changed is clearly shown. By means of the recording instrument, a careful analysis of this art could be made and I believe a driver could discover, himself, his weak points and eliminate them.

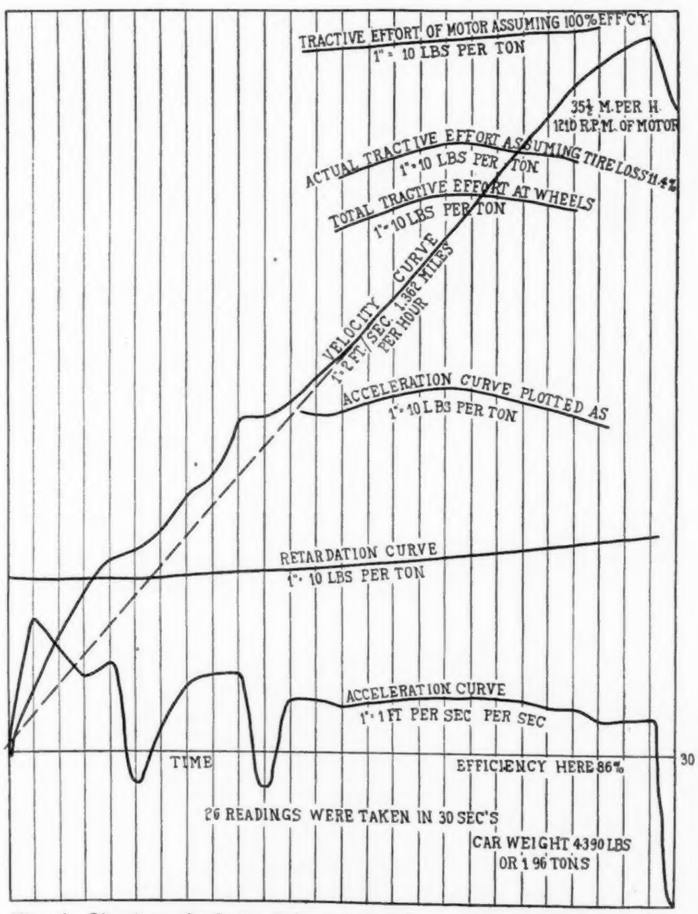


Fig. 1—Chart made from data secured by accelerometer on high-powered foreign car

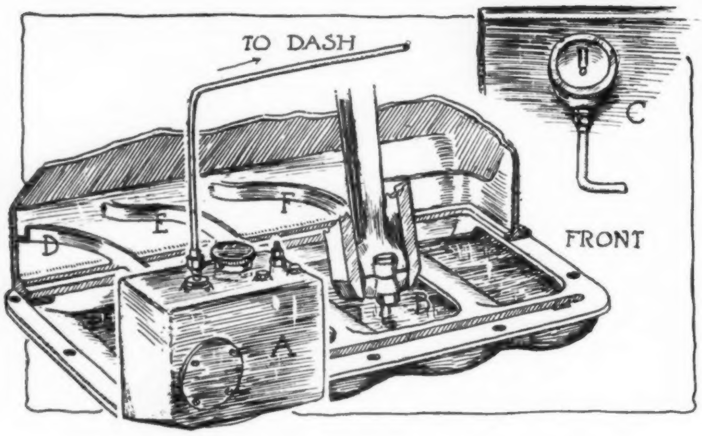


Fig. 2—Principal parts of the Cole lubricating scheme

This chart (Fig. 1) was taken from a series of tests with a well-known foreign car, as it was found that the truck reached its maximum speed too quickly to render its results as distinctive as a powerful pleasure car.

Below this acceleration curve I have plotted a velocity curve. In all the above tests a speedometer was not used except for the very minor purpose of checking a speed reading. This velocity curve is quite independent of the speedometer; depends only on an accurate reading of the accelerometer and a stop watch. If the recording instrument is used the necessity for this disappears.

The actual brake horsepower at the wheels can be determined by this instrument. This is clearly seen by our efficiency tests. A comparison with the torque curve of the motor or horsepower curve can be obtained by knowing the standard bench test curves of the motor. This can be done with still greater accuracy by plotting out a torque curve or acceleration curve in conjunction with the speedometer.

The gradient of a hill can be determined when the car is running by keeping the car at constant velocity, measured by the speedometer, and reading the gradient directly on the instrument.

Braking stresses can be measured within limitations, but unfortunately the instrument is graduated with too small a range for really serious study in this work.

In measuring the retardation of a car, it must be borne in mind that this may not represent accurately the rolling resistance of the car when the motor drives it, owing to the fact that the reverse of the gear wheels, bevel or worm, are being used. This is, however, more of academic than practical interest, at present. The fact is that this instrument may be of valuable help to the testing department.

PIERCE-ARROW.

Buffalo, N. Y.

Lubrication of the Cole Car

Editor THE AUTOMOBILE:—Kindly explain by diagram the lubricating system of the 1913 Cole 40, showing also the proper height at which to keep the lubricant.

St. Louis, Mo. E. H. K.

—The lubricating system employed on the Cole cars is the constant level splash system. In this system the oil is carried in the reservoir in the crankcase. The oil capacities of the different models are as follows: Model 40, 2½ gallons; model 50, 1½ gallons; model 60, 2 gallons. The reservoir is located on the left side of the crankcase in the model 40, and as may be seen in Fig 2 it can be detected by the box-like projection on the side of the crankcase A.

The oil pump, which is driven by a worm gear from the camshaft, is of the plunger type and is contained directly within the oil reservoir so that on account of the copious lubrication which it receives the wear is practically nil. The reduction between the camshaft and the oil pump is 25 to 1, and as the camshaft is running at but one-half the speed of the crankshaft the reduction to the oil pump is 50 to 1 with the crankshaft taken as a basis. There is an adjustable nut by means of which the stroke of the pump and hence the amount of oil delivered at each stroke may be governed.

The oil pump takes the oil from the reservoir and forces it to a sight feed C located on the dash. In this way the operator sees every drop of oil that enters the crankcase and he knows when the supply is running short by the behavior of the sight feed. The oil is sucked into the pump from the bottom on the up stroke and then on the down stroke is forced up into the lead which takes it to the sight feed. After passing through the sight feed the oil is led to the crankcase where it enters a series of troughs B which are located one below each connecting rod. On the bottom of the connecting-rod there is a scoop that catches the oil and throws it up into the cylinders, where it is picked up by the oil wiper rings on the piston and distributed about the cylinder walls. The troughs into which the connecting rods dip are curved so that there will be no danger of all the oil leaving one of the troughs should the car be ascending a steep hill. Another feature which takes care of the lubricating system on a hill is the sloping troughs on the walls of the crankcase. When the car is on a hill there will be a tendency for the oil in the rear trough to become deeper. This excess oil will be thrown by the connecting-rods against the walls of the crankcase from where it will drain into a series of sloping troughs D, E, F which lead the oil to the front end of the crankcase. The slopes of these troughs are so great that in spite of the gradient there will always be a gravity flow of the oil back to the forward end of the crankcase. These sloping troughs keep the oil in circulation even on a level road. There is no return of the oil to the reservoir, the pump feeding fresh oil continuously as it is used up by the motor.

Small Car Gears Give Trouble

Editor THE AUTOMOBILE:—I have one of those small Liberty Brush machines, 1912 model, which pulls well for the kind of car on low and high speed, but when I go to reverse, it grabs and jerks hard enough to break something, and when it does take hold, you can hardly throw it out of gear. Thinking it might be pitched, I soaked it for about 4 weeks with kerosene and then drew that off and cleaned the gearbox thoroughly with more kerosene and gasoline until all parts looked perfectly clean. I then put in a fresh supply of lubricant, tried the reverse, and it was as bad as ever. When I run, say 5 miles or so, the gearbox gets very warm. What do you suppose is the trouble? Where can I get repairs for same? Is the Liberty-Brush still manufactured?

Aspers, Pa. C. H. E.

—The probabilities are that the alignment in the gearbox is bad owing to worn bearings on the layshaft. This will cause the grabbing and chattering you mention and will also increase the friction to such a degree that the gearbox is apt to run quite warm. This will become worse and worse as time goes on, and the only way to cure the trouble would be to replace the worn parts at once and to have the proper alignment made. When the layshaft is out of line the gears are working at an angle towards one another and this will cause a continual humming sound. The way to cure the trouble would be to remove the three nuts on the side of the gearbox and remove the drum which carries the rollers. The drum acts as a wedge and forms a clutch. When the rollers get jammed into this wedge they cut a groove for themselves which renders it almost impossible to get the reverse out. When the drum is removed you can file it out and it will then allow the rollers to take hold smoothly. By taking care of the drum and the alignment of the shaft carrying the gears the trouble will be readily cured. The drum will be readily found and identified by you, as it is 2.5 inches wide and the grooves which are worn in it may be easily found. Another reason that the gears run warm after a time may be

in the fact that the shifter fork arms bear continually against the shaft and the rubbing generates the heat. You can secure part for the Liberty-Brush from the Brush Runabout Co., 246 West Fifty-sixth street, New York City. The manufacture of the car itself has been discontinued.

Sticking Valve Causes Knock

Editor THE AUTOMOBILE:—I have here a Model 31 Buick which has developed a small knock that I have located, but seem unable to remedy. It is caused by the valve tappet on valve No. 7 overrunning the cam; valve No. 7 is the intake valve on No. 4 cylinder. When cam No. 7 revolves to open center, then cam roller or tappet jumps from center to part way down on cam, causing the knock. This car is not over 6 weeks old and this knock strikes me as a curious phenomenon in so new a car. I have tried changing the valve springs, the rocker arms and also the tappets, and none of these things help one iota; none of the other valves act in this manner. As the cams are all integral on the shaft, I cannot change cams. Do you think the springs are weak or that there is a defect in the cam?

Curtis, Neb. RAY A. CONOVER.

The probable trouble is in the sticking of the valve, because part of the stem which is below the guide is either larger in diameter than the upper part of the stem, or has a slight burr or nick in it. This would cause the valve to be lifted by the cam, but with the cam released at the valve would not fall immediately and would spring down with an audible snap, Fig. 3.

Examine the valve stem and calibrate it, and if you find that the burr exists you can file it down. If the stem is a little too large in diameter at the bottom, it must be turned down in a lathe. The same may be true of the tappet or tappet guide.

Probably a Bad Case of Carbon

Editor THE AUTOMOBILE:—I have a 1910 model T Ford car with which I am having trouble. This car was overhauled this spring at the garage. After running 25 or 30 miles it would cough, choke and jerk and lose all power and would not take the least grade on high speed. I took out the spark-plugs and found they were very dirty and covered with oil. I cleaned them well, saw that I had a good spark, and the car ran well with lots of power for 20 or 25 miles. Then it began to cough and jerk. It would not run on high speed and heated up badly and ran slowly on low speed unless I ran the engine very fast. I again cleaned the plugs, found them the same, and the car ran well for a short time as before. The engine seems to run well when idle but when the load is on chokes and jerks and has no power and heats up. I am using Polarine oil and have tried using less oil but find no change. I saw an inquiry in THE AUTOMOBILE for June 5 of a motor choking up at low speed and you attributed the trouble to the valves being dirty. That may be the trouble in my case, but I have not run over 200 miles since the valves were ground, and if they are dirty now there must be some cause for their being so with so little running. I am using a well-known carbureter but have been advised to try another carbureter. What do you think?

Chatham, N. B. S. D. HECKBERT.

—It would seem that the piston rings are so badly gummed up with carbon that the oil works its way past them and gets into the cylinders. The best course of procedure on your part would be to take the cylinder heads off and clean the combustion space thoroughly. The connecting-rod bearing caps can also be disconnected and the cylinders pushed up so that you can get at the rings and clean them also. You will find that the motor will run much better after this has been done. It would be a good idea for you to take out the piston rings and put in a new set, because some of the oil which works its way into the cylinders is no doubt directly caused by the space between the cylinders and the worn rings.

The carbureter you have should give you perfect satisfaction on this car and it is hardly likely that your trouble can be traced to the carbureter unless you are running with it entirely out of adjutsment. This would not seem to be the case, though, since you get perfect satisfaction for the first few miles.

The reason that your trouble appears to be due to carbon is because it takes just a few miles for the carbon to heat up and become effective in producing internal disorder in the motor. Another point which would lead to the belief that the cause is carbon is that the spark-plugs become dirty as soon as you have been running for a little while. They should not have to be cleaned except after several hundred miles.

Difference Between Axle Designs

Editor THE AUTOMOBILE:—Kindly explain in full the difference between dead, semi-floating and full-floating axles and also the functions of each.

Jersey City, N. J. W. H. DYKEMAN.

—The adjectives dead, floating and semi-floating all apply to the characteristics of the different methods of mounting and the functions of the rear axle. As the name implies, the dead axle is one in which no motion is transmitted. The dead axle is fixed and the wheels revolve upon it. An example of this is in the chain driven car. In this case the motion is transmitted directly to the wheels and the axle remains stationary. An axle of this type does not require a housing and, in fact, never has one. It is merely a dead member upon each end of which there is a spindle for supporting the wheel. The dead axle carries the full weight of the chassis, the entire weight being borne by the wheel, wheel bearings and axle.

The floating axle is one in which the axle has no other duty than the transmission of the power. The axle itself is entirely free and generally can be pulled right out of the housing by simply removing the hub cap of the wheel. The weight of the car is carried by the axle housing and the wheel bearings revolve upon an extension of this housing. The axle is squared at its ends or arranged in some other manner for the purpose of engaging with the driving members and also the driven members, the former being the differential and the latter the wheels.

Semi-floating axles are those in which the weight is carried by the axle housing and in which the axle member has no other duty to perform except the transmission of power. They differ, however, from the floating type in that they cannot be withdrawn by removing the hub cap because of their more permanent connection to the wheel. In general, the semi-floating can be distinguished from the floating by the fact that the wheel has to be removed to take out the former, while the latter may be withdrawn by simply taking off the hub caps.

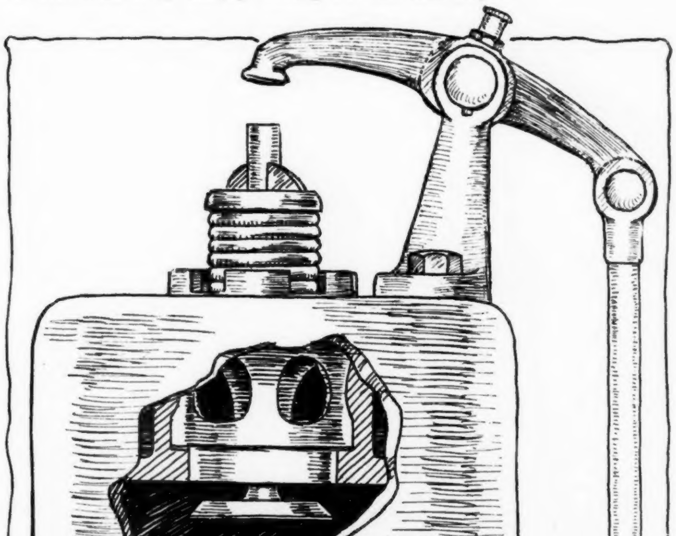


Fig. 3—Sticking valve, which may spring up and cause knock

The Engineering Digest

Correct Timing of Valve Action Now Most Important Factor for Securing Convenient Operation of Cars with High-Speed Motors—Carbureter of Thoughtful Design

A hint from Koechlin on offset crankshafts—Formula for promoters of good roads—Revised constants for calculating engineers—Clutch-differential for simplified cars

MODERN Racing Motors with Valve Timing Unsuitable for Ordinary Traffic—The conservative manufacturers in France are at pains to explain to the public why motors built to win races in which the cylinder volume or the fuel consumption is limited can give only poor results in stock cars, apart from all question of price. The valve timing is the principal factor involved, amounting, as it does now, in the motors designed to give the highest efficiency at the highest speed, to a change in the cycle of the motor, and this a change resulting in poor economy, lack of responsiveness and cumbersome operation at the low motor speeds which are those of the greatest importance for ordinary motoring. Henry Féron treats this subject in the official organ of the manufacturers' association, though with much reserve, which may be due to the prominence of both the opposed camps of constructors. The possibility that the main objection to the highly pushed motor might be removed if some designer should succeed in making the valve timing adjustable—by longitudinal displacement of the camshaft, for example, as now resorted to for the purpose of using the motor as a brake on long declivities—is perhaps also kept in mind. The reasoning is about as follows:

The racing regulations prescribing a limited cylinder volume have combined with the general efforts for attaining fuel economy to favor the adoption of higher and higher rotary speeds. These high speeds have first of all necessitated the lightening of all reciprocating parts and the perfecting of lubrication methods, but the principal difficulty was experienced in the matter of making the motor fill up with gas and discharge the exhaust gas during the extraordinarily short periods which remained for these functions. When a motor turns at 3,600 revolutions per minute, as it does in some instances, it must fill up, as well as exhaust, 30 times in one second, and the duration of one of these functions cannot exceed a 1/120 part of a second with a uniform division of the cycle.

At first the desired results were sought through the enlargement of all valve ports, but it had to be recognized that beyond a certain limit increased valve areas did not produce a corresponding increase of the motor power. The attention was then turned to the valve timing. The closing of the inlet valve was delayed more and more while the opening of the exhaust valve was advanced, and then this was supplemented by advancing the admission and retarding the closure of the exhaust until the condition was reached in some motors of having both valves open at the same time for a small fraction of the cycle. Only the inertia of the gases moving at very high speed explained how this arrangement could work out. Their momentum could not be reversed instantaneously, neither that of the exhaust gases moving downward under the force of the preceding explosion in the cylinder nor that of the new charge in the induction manifold and the induction pipe. So a clash of the gases was avoided, though both valves were open, until an equilibrium in the gas currents had established itself, and by that time one of the valves was closed. In the development of valve timing on this principle it was found that the exhaust valve opening should be much advanced and that the closing should be slightly retarded.

By keeping the valves open beyond the periods allotted for this purpose in slow motors it became possible to make the shape of the cams less precipitous (since they could span wider arcs on the camshaft), and thus the changed valve timing also permitted the operation of the valves at a higher rotary speed, with the same valve weights and spring tensions, and in this respect the requirements for operating at high speed were not in conflict. Unfortunately, however, the timing which increases the torque and power of the motor at a certain maximum rotary speed reduces the torque for the lower speeds. Slow industrial motors usually give their highest torque with the valves opening and closing at centers, but in automobile motors, in which the valve timing is now always more or less modified to permit a gain of power at the highest speeds, the torque obtained at the lower range of speeds is considerably lower than it would be if the valve timing coincided with the centers, with the result that gear changing becomes more frequently necessary than it would be if the sacrifice to high power derived from excessive speed were not made. In the most efficient modern racing motors this drawback, so far as ordinary motoring purposes are concerned, is so strongly accentuated as to make the same motor which is highly economical at racing speeds very wasteful of fuel for touring or ordinary traffic, or else very cumbersome to operate.

The principle is easily made clear to the public, as all can understand that if an exhaust valve is opened 50 millimeters before low center, the gas expansion for 50 millimeters is entirely lost, so long as the motor turns slowly. And if the cylinder is completely filled with a fresh charge at the next low center and the inlet valve nevertheless is not closed before the piston has been raised 50 millimeters, it is clear that a volume of gas corresponding to a displacement of 50 millimeters has been expelled and that this expulsion of fuel is so much more complete as the valve ports and the pipes are larger.

The accusation so frequently heard of late, to the effect that certain motors pull only when wide open, is, for the reasons given, more likely to hold good the smaller the motor dimensions are in proportion to the load, as it is in such small motors that extreme valve timing and very large ports must of necessity be employed in order to attain the high speeds by means of which they are enabled to cope with their hardest work.

At the high speeds there can be no objection to the simultaneous opening of inlet and exhaust valves in motors of this class, as the exhaust expands with considerable speed and, so to say, draws the new charge into its wake without causing it to become ignited. But in the same motor operated at low speed the charges are likely to be blown back to the carbureter and even ignited there.

On the whole the tendency is to produce today, largely with a view to economy, a class of motors which can be operated properly at one speed only, but with the difference, in compari-

son with earlier days when the same could be said, that the proper speed is now the highest while at the former period the most efficient speed was a relatively low one, owing to the small size of valves and the generally backward state of motor technique. The consequences are similar, however: In order to make the motor run always at the speed at which it pulls best or is most responsive, whether to start the vehicle or to run it at different speeds, uphill and downhill, with light or with heavy load, it is necessary to have a large number of gear changes and a very supple clutch.

It may be considered the characteristic feature of the situation that the demands with regard to motor design which answer the requirements for racing motors perfectly and which have been supposed to subserve the popular demand for an economical motor for general purposes in reality have led to the development of a type of racing motor which cannot serve as an example for imitation or adaptation in motors for stock cars, since the drivers of the latter much prefer the accelerator pedal or the gas lever to the change gear lever and like to see the flexibility of their motors increased as much as practicable, so as to reduce the number of required operations of clutch and gears to a minimum.—From *Omnia*, July 12.

[The exposition of the subject, as given above, seems one-sided, in so far as no consideration is given to the question whether the racing motor with extreme valve timing may not be fitted for ordinary motoring by changing this feature of valve timing alone and choosing its dimensions for pleasure cars with reference to the lowered speed.—Ed.]

THE Cannevel Carbureter—Among novelties in the French accessory market the Cannevel carbureter is heralded as a construction which has been on trial for many years and finally has been perfected. It has the customary float chamber and inlets for cold and heated air. Fig. 1 shows the arrangement of the jets by which a different action is provided for slow, normal and high-speed operation as well as suitable transitory modes of action for starts and accelerations. HH represents the float level, B the main jet with the reduced nozzle *b* from which under normal operations the gasoline is discharged against a baffle plate or hat causing it to be pulverized and scattered to the sides, so as to present a large horizontal area of fuel globules to the air current. C is a bore constituting a reserve of fuel remaining available for accelerations during normal operation as well as for starts. G represents lateral canals in the main jet serving to regulate the gasoline feed at high speeds by admitting air from duct C which communicates with the atmosphere through canals *k* and K. The action of the main air current upon these canals G is in turn regulated by the inclined collar I. D is a screw formed with a pin which enters the conduit from which branches the canal J serving as the feed channel for slow running, at stops, and for starts. The position of the pin regulates the feed. Another adjustment screw E regulates the admission of air to J. When heated air is taken in, it strikes first those parts of the carbureter which serve the motor when it is running idle and slowly and for starts.—From *La Pratique Automobile*.

OFFSET Crankshaft No Advantage in High-Speed Motors—According to S. Gerster, who seems to be connected with the manufacture of the Koechlin two-cycle motor in France, the efficiency of a very high-speed motor is not increased by offsetting the crankshaft with relation to the cylinder axis. To prove the contention, he considers a motor of 85 by 132 millimeters bore and stroke in which the piston weighs 400 grams, the connecting-rod 600 grams and which turns at 3,800 revolutions per minute. The linear piston speed averages 16.8 meters and the pressure from the explosion, counting 18 kilograms per square centimeter of piston area, reaches 1,020 kilograms.

The inertia of the piston and the connecting-rod takes the form of a tensile or a compressive stress in the rod at each change of direction. The largest value E of this stress is the following:

$$E = 1.25\,MV^2 \text{ divided by } R$$

in which M designates the mass of the piston and the rod, V the circumferential speed of the crankpin and R the crankarm radius.

With the dimensions assumed above, V becomes 26 meters, and the momentum therefore equals, according to the formula, 1,280 kilograms. The force of the momentum is thus superior to that of the explosion.

In a motor with offset crankshaft, as represented in Fig. 2A, the aim is to reduce the value of P*l*, which is the lateral resultant of the oblique reaction from the explosive pressure P*x*; and to do so is logical when the motor turns slowly and the forces of inertia can be considered negligible. Fig. 2B, on the other hand, shows the stresses arising at the moment of an explosion in the motor when it turns at 3,800 revolutions. The stress P*i*, due to the inertia of piston and rod, acts in the opposite direction to the force P*x* of the explosion, and as P*i* is larger than P*x*, it is the rod which draws the piston. The difference between the two resultants P*l* and P*il* is the lateral force applied to the piston. It becomes almost nil. As P*il* is larger than P*l*, the lateral piston pressure is opposite to that in

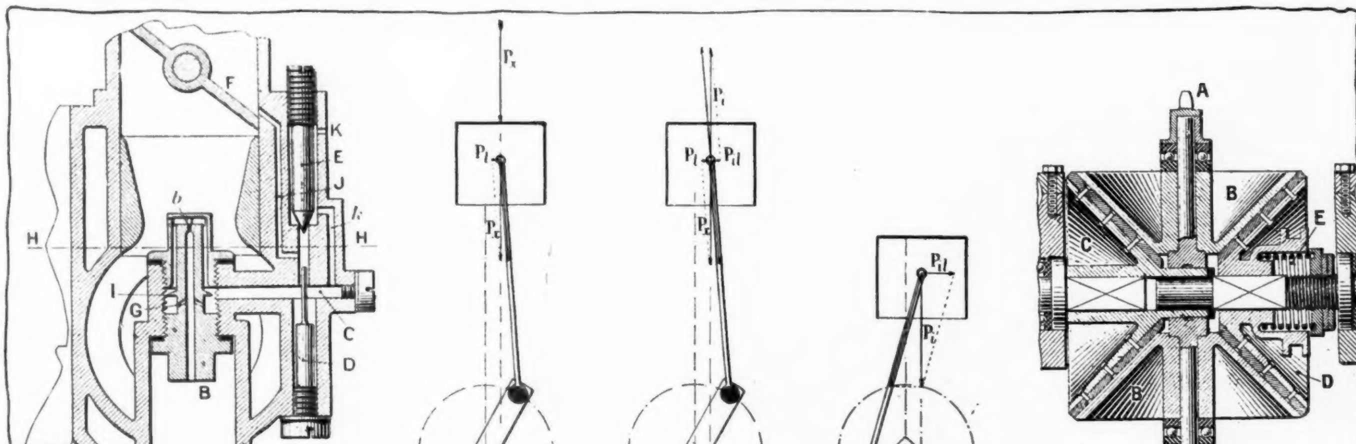


Fig. 1—Portion of Cannevel carbureter. Fig. 2, A, B, C—Forces acting with offset crankshaft. Fig. 3—Friction differential and clutch

Fig. 2A. Consequently the frictions arising at the moment of the explosion are almost neutralized.

Fig. 2C shows the piston at the moment when it ascends. P*i* again represents the force of the momentum, which is of the same value as at the moment of the explosion, but P*il*, the normal lateral resultant, has become much larger than before. Its value is increased the more the crankshaft is offset. Consequently the work absorbed in frictions of the piston becomes large during the periods of compression and exhaust. It is self-evident that the work lost in this manner in the offset motor is larger than that lost in a symmetrical motor. In fact, in the case of high-speed motors in which for reasons relating to strength or production the weight of the piston cannot be reduced, there is an advantage in offsetting the crankshaft a little to the opposite side. In the Koechlin motor the best results have been obtained, in accordance herewith, by offsetting the shaft 5 millimeters to the right, as seen from the driver's seat.—From *La Technique Automobile*, July 15.

WIDENING Interest in Road Building—Thirty-nine states were represented at the road congress held in London in June of this year, and 2,700 individuals took part in the proceedings. The number of subjects discussed and essays presented was, according to practically inclined experts, far too large. Among the recommendations made by the congress were the following: That new through-roads should not pass through the centers of large cities; that slow and rapid traffic should be separated wherever possible; that roads on which there must be a street car line should have the latter in the middle; that drivers should be systematically and minutely instructed and that a special course should be established in public schools to teach children the best means for avoiding the dangers of the road. The social side of the congress was one of the most appreciated features. The next congress will be held in Munich in 1916.—From *Le Génie Civil*, July 12.

COMBINED Differential and Clutch—In the widespread search for simplified and economical construction which is the keynote to the cyclecar movement in England, Mr. G. Brown has struck the idea of building a differential composed of cones in frictional contact and at the same time to make one of the planetary cones adjustable and thereby utilizing the mechanism as a clutch as well. Fig. 3 shows the construction, the patent for which is described in *The Autocar* and mentioned in *Omnia* of July 12.

AA is the single chain sprocket by means of which the car is supposed to be driven, BB the cones in the plane of the drive, C and D the differentially acting cones and E the clutch spring which is operated by a lever with a screw. The cones are faced with friction material.

FORMULAS for Road Advocates—While the public value of a new road often depends upon its effect upon real estate prices and upon diverting traffic from other roads which are already established, arguments advanced by road projectors on the basis of these factors must always partake more or less of the nature of a speculation. It is advisable to have more conservative arguments and calculations at hand. In a report to the road congress held in London in June, Emil Masik of Brünn, Austria, suggested the use of certain formulas which might serve this purpose. After describing a purely mechanical method for laying out a new route, he writes:

An estimate of the expected saving in the cost of transportation by the new route can be arrived at in the following manner: If l is the length of the new road in kilometers, C the number of tons of goods to be transported annually, b the reduction in the cost of transportation per ton-kilometer to be effected by means of the new road and expressed in crowns (dollars), B the cost of upkeep, g the annual cost of repairs per ton and A the cost of construction per kilometer—then the annual saving will be bCl.

If this amount is sufficient to cover the complete cost of maintenance, which is $l(B + gC)$ and to provide a sufficient sinking fund to repay the original cost of construction, Al, then it will pay the public to build the new road, and the annual income R to the public from the new road in crowns (dollars) per kilometer will be:

$$R = \frac{bCl - (B + gC)l}{Al} = \frac{C(b - g) - B}{A}$$

It is to be feared that opposition to a road project will sometimes hinge upon getting a formula defining in an acceptable manner who are comprised in "the public," since those who pay the cost and those who derive the benefits are not necessarily identical. A sort of formula of this kind is supplied, however, through the legislation which in the United States in many cases divides the cost among the federal, the state and the municipal governments.—From *General Reports of the Third International Road Congress*, London, 1913.

SHOCK Tests Graphically Recorded by Cinematograph—Although it is now generally recognized that dynamic tests of construction steels for automobiles are at least equal in practical importance to the tests of tensile strength and other static resistances to deformation, they have not gained the commercial importance of the latter because it has been difficult to record the acting forces and the results in exact terms or by means of diagrams and curves. This disadvantage has now been overcome through the ingenious use of the cinematograph process in a modified form by which a continuous image is produced rather than a succession of images taken at close intervals. The method was devised by Professor Martens at the royal laboratory for the testing of materials at Gross-Lichterfelde near Berlin and has been developed and improved since the method was first taken up in 1909. It is described and illustrated in *Revue de Métallurgie* for July, the data being taken from *Zeitschrift des Vereines Deutscher Ingenieure*.

ANNUAL Tables of Constants—Every year new numerical data are laid down or old ones corrected relating to chemistry, physics and technology, and the International Association of Academies watches the progress made in this respect. Through an international committee which was nominated at the Seventh International Congress of Chemistry, held in London in 1909, it publishes a volume of its findings every year, and these are of especial value for research work in which it is important to avoid the use of formulas and other data which have been superseded. Volume II, for 1911, has now appeared, the English edition in charge of the University of Chicago Press of Chicago. It supplements the Smithsonian annual tables of similar import. The new volume contains, among other matters, new data on the heat value of solid and liquid fuels, on the expansion of different substances, on the thermic efficiency of machines, a large number of metallurgical data relating to both heat treatment and mechanical tests and the latest figures from the fields of electricity and thermo-electricity. The information, it is stated, is not more than 15 months behind the date of publication and carefully verified.—From *Revue de Mécanique*, June.

WHO Is This Genial Manufacturer?—A paragrapher of *Revue de l'Automobile* tells the story: "From my school days I remember a little restaurant where the host, when he felt in a generous mood, would sometimes treat us to coffee at a neighboring café. He would say with an air of conviction: 'Let us go in next door: it is better there.' No doubt it is the same reason which has made one of our best-known automobile builders choose for his personal use and for all trips of any importance—an American car. Only a sage would dare to conclude that it is the part of wisdom to seek elsewhere than in his own stock for a vehicle without flaws or to which he may entrust his person without fear. . . ."

Electric Apparatus Eats Up Gasoline

From 5 to 12 Per Cent. of the Total Fuel Consumed Can Be Directly Charged to the Current Generator, Says Prest-O-Lite Company

1—How much power and fuel does a dynamo and battery lighting system consume on a gasoline automobile?
2—What does electric lighting cost as compared with gas lighting?
3—What is the comparative reliability of the two systems?
4—Is it a fact that all the care which an electric lighting system demands at the hands of the average automobile owner is putting a little water in the battery now and then?
5—Is electric lighting any more convenient than gas lighting?
6—Is the addition of so-called electrical conveniences to the gasoline automobile a step in the right direction?
7—What service can the automobile owner expect in connection with the system he chooses, at the hands of dealers, especially if he finds need of assistance 25 or 40 miles from home?

THESE are all matters upon which the great majority of motorists have heretofore been compelled to guess and perhaps have been perfectly willing to guess, and have therefore received more positive misinformation than has ever accompanied any other single phase of automobile construction.

Let us first analyze the question of power and fuel consumption.

The opinion has become quite general that when an automobile engine is already in operation, propelling the car, it might just as well be called upon to operate a dynamo and generate electricity, and that the power loss incident to this practice is too slight to be of consequence.

The reader is doubtless familiar with the claim made quite generally by manufacturers of electrical equipment, that the apparatus is operated by the waste power of the engine. The truth has been still further shrouded in mystery by general statements to the effect that this or that electric generator consumed "one-tenth of 1 horsepower" or some other such fraction, the accuracy of which is problematic, but in any event not very informative to the layman.

This notion has become so widespread that we determined to put the matter to practical test upon the Indianapolis Motor Speedway, and get the answer in terms of "miles per gallon" and in such form that he who runs may read.

The result of these tests show that from 5 per cent. to 12 per cent. of the fuel fed into the engine of an electric lighted car is consumed by the electrical apparatus.

The method of testing involved disconnecting the main gasoline and attaching to the carbureter a special line and testing can, the bottom of which was so constructed as to drain perfectly. The car under test was first run as far as possible on a gallon of gasoline with the engine connected to the electric generator and the battery being charged, and then with the generator disconnected, another measured gallon was consumed. Identical conditions of passenger load, carbureter adjustment, speed of car, and position of spark were observed and the mileage in each instance as recorded on the odometer was checked against the known mileage of the speedway.

Three of the four tests shown in the tabulated report were driven by the dealers of the cars under test, and the remaining test was conducted and observed by the representative of a well-known automobile magazine.

To many a motorist and to many a dealer these figures will seem all the more startling because of the well-known fact that an idle automobile dynamo can be spun with one finger. However, an idle dynamo and a dynamo operated at speed and generating electricity are two entirely different propositions. The electrical load or magnetic drag are not present in an idle dynamo.

A thing for the motorist to consider is the fact that electric lighting dynamos on motor cars are rated at 25 per cent. efficiency. This means that on this small sized dynamo 75 per cent. of the power put into it is wasted. And on top of this the major portion of the dynamo's output is lost before it gets to the lamps, and in the inefficiency of the storage battery.

Waste power, so-called, on a gasoline engine which is propelling a car, is a rather scarce article. The speed and power of the engine is closely regulated by the throttle, and the operator sets his spark and throttle levers in accordance with the load of the engine and the speed at which the car is to move. If it were necessary for him to run his engine idle at high speed, then he would have waste power and plenty of it.

Another point to be remembered is that a goodly share of the engine's power is always devoted to overcoming the dead weight of the car and propelling it under normal conditions at normal speed. Therefore, any consumption of power and fuel which comes on top of the normal load of the engine decreases the surplus power of the engine in much greater proportion than it would the total rated power of the engine.

Tests Nos. 1, 2 and 4 in the tabulated report were driven with the headlight and tail-light burning while the electric generator was operating. Test No. 3 was driven with all lights extinguished.

Test No. 3, involving the flywheel type of generator, was made by disconnecting the wires leading from the generator. In this construction, of course, it was impossible to remove the generator from the flywheel, thereby giving the engine complete relief from the magnetic load on the second part of the test. Something should therefore be added to the percentage shown on this car.

The car in Test No. 4 has no magneto and since the storage battery was not deemed sufficiently charged, both sections of this test were driven on dry cell ignition. This report takes no account of any possible weakening of this ignition on the second part of the test with the generator disconnected, the condition of the dry cells being unknown.

But even ignoring these factors, this report shows an average of over 10.7 per cent. fuel consumption by the electric dynamo on the moderate powered, moderate priced cars tested, which cars, by the way, constitute the vast majority of all American cars made and sold.

While the percentage of power loss due to generating electricity is smaller on the larger engines, the mileage per gallon is also smaller, so that the expense, in dollars and cents, is about the same.

And yet these percentages are not large enough to show the exact difference in power and fuel consumption between a car equipped with gas lighting and the same car equipped with electric lighting, because in these tests we were not permitted to relieve the car of the large difference in weight between its electric system and a gas lighting system. The percentages shown were obtained merely by disconnecting the generator so that the engine would not have to operate it.

Consumption Charges to Dynamo

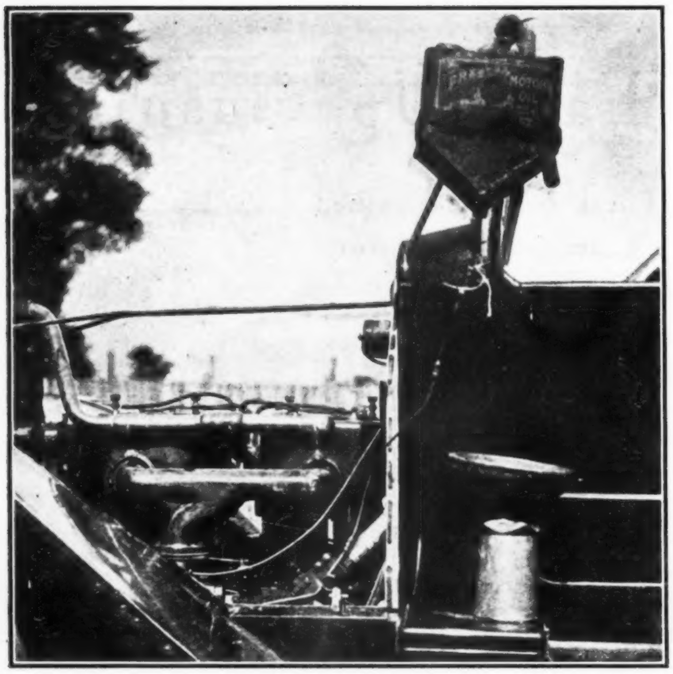
It has been suggested that this percentage of fuel which is devoted to the creation of the electricity should be charged partly against the lights and partly against the starter, since current is used for both. But this matter will stand a little closer analysis.

It is the standard contention of electric starter manufacturers that the same dynamo and battery which would be needed for lights alone will operate the starter. This we believe is true, and the only allowance for difference in cost in operation should be for the added weight of the starting mechanism itself and for the added wear and tear on the battery.

These items, however, have little or no connection with the generation of electricity by the dynamo. The size of the battery is largely determined by the number of hours of light which it must provide, and this in turn determines the size of dynamo which is to charge the battery.

For instance, the discharge rate for two average headlights and one tail-light is between 9 and 11 amperes. Therefore, the dynamo must generate close to 14 amperes if the battery is to be charged at all for the owner who does most of his driving by night and little by day.

It is hard to draw the line exactly in this matter. We have heard of cases where the car owner who had electric lights and not electric starter had to run his engine for an hour before he



Testing apparatus used in determining fuel consumption of generator

could go out for his evening drive in order to charge the battery sufficiently. On the other hand, some of the cars on the Indiana-Pacific tour have had to burn their lights a few hours each day, in the daytime, to keep from overcharging the battery, in spite of the current consumed by the electric starter.

It is quite generally recognized throughout the trade that batteries now used are not large enough even for lights alone. Battery manufacturers are trying to induce motor car makers to use larger batteries, and motor car makers, on the other hand, are anxious to use as small a battery as possible in order to hold down the weight, which is already larger than they like.

It is true, of course, that without the consumption of current by the electric starter, the battery under normal conditions would be charged sooner, but since the dynamo runs whenever the engine runs its output of current would either be delivered to the battery, overcharging it, or eaten up in resistance coils if provided.

Any theory that the elimination of the electric starter would reduce the percentage of power loss will not hold water.

Comparison of Cost

Of course, the power and fuel loss due to generating electricity is only one item of the expense, but having determined this let us proceed to a conservative estimate of electric lighting expense on any moderated-priced, moderate-powered car, as follows:

Fuel converted into electrical energy (10 per cent. of annual bill, based on 9000 miles in a season, 15 miles per gallon, with gasoline at 20 cents	$12.00
Battery, assuming 2 years' life—which is excessive—and a replacement cost of $25—which is conservative—per year	12.50
Lamp renewals (estimate of the Society of Automobile Engineers), 6 average, at 50 cents each, per year	3.00
Repairs (conservative, but based on 2 years' use) per year	5.00
Total per year, at least	$32.50
The average Prest-O-Lite user (according to our books) pays for light per year, less than	$10.00

The amount of money which any user of gas lighting pays depends entirely upon the amount of gas he burns. Some users of Prest-O-Lite pay as high as $15 per year and even more, while others pay as little as $6 per year and even less. The average, however, as shown by our books, is somewhere between $9 and $10 per year.

It should be noted, however, that unlike the gas user, the electric light user pays his bill whether he uses the lights much or not, and may pay an even larger bill if he does not use the lights at all.

The motorist who does not cover 9,000 miles a year can easily adjust this item in our estimate to suit his own case.

Signed statements in our file show that our estimate of electric lighting expense is very conservative. We have statements from automobile owners who have discontinued the use of electric light who say that the expense in less than one year's operation has run over $70. On the other hand, we know of cases where the only visible expense to the owner has been for lamp bulbs, but invariably in such cases the owner is under the impression that he is not devoting any appreciable fuel to generating electricity, and is ignoring the fact that his cost per year on repairs and battery replacements should not be based upon the first year alone.

Let it also be noted that we have omitted from the statement of expense on electric lighting any consideration of these important elements of cost: Additional tire wear, and additional fuel and lubricant due to the increased weight of car and additional up-keep in general because of this added weight.

Explanation of Battery Life

The item of battery life calls for some explanation. The theoretical life of a storage battery is three years or more, but this theoretical life is based on a kind of care and attention which will not be given by the average automobile owner and presupposes that the battery will be carefully, slowly discharged as well as charged under scientific conditions, which it cannot be in the systems now in use on gasoline automobiles. We have tested cars on the Indianapolis Speedway on which the battery charging started at 12 amperes and then for no apparent reason gradually crept up to 25 amperes. Charging rates of 14, 16 and 18 amperes are not uncommon. A consultation of any of the instruction books of storage battery makers will show whether any battery of this size is designed to give long service under such spasmodic, unscientific charging and go-as-you-please discharging.

Our information, gathered from dealers, is that storage batteries used for both starting and lighting are having an average life of less than one year. Batteries used for lighting alone are having an average life of considerably less than two years. We doubt very much if any owner will get two years' life out of the battery, particularly in view of the abuse and neglect which it receives, so that our allowance of two years' battery life in the estimate of electric lighting expense is excessive if anything. I know of no battery used for automobile lighting which its maker guarantees for more than one year.

What has been said regarding the cost of electric lighting applies only to dynamo and battery system. The operation of tiny bulbs for side and tail lights only, by storage battery without dynamo, is an entirely different matter, for in this case the battery is small, the cost of charging is small and, above all, the battery is charged under fairly scientific conditions by someone who knows something, at least, regarding battery charging, and is slowly discharged. In this case, too, no gasoline is being converted into electrical energy, the connections are few, and there is no operation or care of other electrical apparatus on the car. I think it can be proven that acetylene can be used with small burners in side and tail lamps with equal convenience and greater economy, but since the expense of either method is not apt to be excessive, convenience considered, extensive comment seems unnecessary.

One of the most interesting features of our file is the data showing the number of electricians, dealers in electrical supplies, and officers of electric lighting companies who are using gas lighting on their automobiles. It must be presumed that these people have more than the average ability to care for electrical systems, but do not care to assume the responsibility.

It is generally known among electricians that the efficiency of electric lighting sets of the size permissible on gasoline automobiles is very low, and they necessarily cannot be substantial enough or accurate enough in action to insure reliability. And when, on top of all this, one considers the almost total lack of electrical knowledge on the part of the average amateur operator, and his well-known disposition to neglect and abuse his apparatus, I think it can be safely said that the electric lighting of automobiles is not only unreliable, but never will be anything else.

In addition to the service furnished by the manufacturers of electric equipment, motor car manufacturers have been forced to maintain a staff of electrical experts whom they can send to all parts of the country, which emphasizes not only the fact that a new and extremely unreliable element has been added to the automobile, but also the fact that only the manufacturer can be relied upon for intelligent service on the equipment.

Electric Service Doubtful

That this traveling expert electrical service will ever be adequate defies imagination. Certain it is that this service, unless radically and promptly increased during the coming season, will be of even more doubtful convenience to the motor car owner, than it has been during the past season, not only because of the increased percentage of electrically equipped cars in the present production, but also because of the need of constantly increasing service as the equipment on older cars shows the effect of age.

It should be noted, too, that the owner who has been sold an

electrically equipped car on the representation that troubles are few and easily remedied expects to receive repairs and adjustments gratis and has been receiving them on this basis. The establishment of privately owned expert service stations would mean that the automobile owner would have to pay for repairs and adjustments, and it remains to be seen whether he would do this, especially on equipment represented as being thoroughly reliable and embodying practically no operating expense.

Any discussion of battery life and repairs naturally brings forth the reply, "Yes, but the user should take proper care of the battery."

Quite true, but is the average automobile owner fitted to be a battery expert?

In buying an electrically equipped car, one of the things the average customer is told is: "Put a little water in the battery now and then. That's all you have to do. The rest of the system is better off if you leave it alone."

Somewhere in the side pockets or tool box of nearly every electrically equipped car there are instruction books of storage battery makers and by the maker of the starting system. Do these instruction books tell the owner to put water in the battery and then leave the rest alone? No; they distinctly do not. Instruction books are unnecessary if the care of a storage battery and electric system in general were as simple as one is led to believe.

The complaint arises from electrical equipment manufacturers, automobile manufacturer, and automobile dealer alike, that the automobile owner is abusing and neglecting his electrical system. Undoubtedly this is true. But is the owner to blame? Is he told when he buys the car that he is getting something which only an electrician can properly care for? Can proper treatment be expected at the hands of a man who does not know a cut-in relay or a hydrometer, or a low-reading voltmeter, when he sees one in broad daylight?

Any analysis of this matter shows that the dealer, in his anxiety to take advantage of the magic spell which the word "electricity" casts over the average human being, is forgetting to show the customer the instruction books themselves. True, such a course might lose sales, and the owner who doesn't even tighten his grease cups once a week might not follow the instruction books, even if he were asked to do so, but he would at least be buying with his eyes wide open.

The automobile manufacturer and the automobile owner alike have in the past depended largely upon the retail dealer and the garage for service. Electrical equipment, however, has injected an element which very few dealers can adjust and repair and which many are unwilling even to attempt repairing.

It is readily apparent that the plight of the average automobile owner, whose electric light goes out while he is taking an evening spin in the country, is not materially improved by the factory service which is being rendered, nor would be by the establishment of privately owned service stations in the larger cities. He may grope his way into the nearest small town and look up the garage, but while he will find acetylene exchange service in all such places, he will not find electrical repair service.

Here is a situation which the motorist should be permitted to know so that he can look it full in the face.

A Step in the Right Direction

As I see it, the two largest factors of influence in promoting the growth of the automobile industry, and making possible the sale of cars to the present large number, are these:

1. The simplification of the motor car so that a man of very meager mechanical knowledge could operate it with a wonderful freedom from trouble, and a reduction in the price and weight of cars, so that a man of moderate income could afford to buy and operate.

2. The perfection of an acetylene lighting system at once simple, economical and reliable, backed by universal exchange service, insuring bright dependable light for night riding. Many an automobile purchaser is actuated solely by his desire to be able to get out at night with his family and take a spin over the boulevards or into the country.

These things being admittedly true, it is clearly a step in the wrong direction to reserve the whole proceeding, increase the price of the car, increase its weight, increase its general upkeep and operating expense, increase its complications and equip it with unreliable light.

It is a notorious fact that cars in general are getting heavier. True, electrical equipment is not wholly responsible for this, but it is the largest single element in this tendency. It must be remembered that when a motor car maker adds 200 pounds of electrical equipment, he must strengthen the construction proportionately throughout, perhaps putting an extra cross member in the frame, using heavier frames, heavier springs and larger tires, and using a larger engine, not only because of the power consumption of the electrical apparatus, but because of added weight all through the cars. Thus it is that cars which formerly listed at 2,800 pounds are now weighing 4100 to 4300 pounds.

Undoubtedly the purchaser of automobiles is responsible for this condition, but not wholly so. On this point the craze for electric lights is typical. The demand for electric lights on automobiles always existed. And when the dynamo-battery systems made their advent, the public was assured, "At last, we've got it." The public was overpowered by the alluring prospect of having electric current generated by the engine "for nothing" and with practically no trouble, and so the craze for electric lighting spread like wild fire. It can be shown today that the public demand was an absolutely unthinking one, based upon almost total ignorance what the application of this equipment to an automobile really meant. The demand thus reached the dealer who had not the information to combat it and perhaps not even the disposition to do so, and the dealer in turn assured the factory that cars could not be sold without electric equipment. Automobile manufacturers in general knew what they were in for when they added this equipment, and knew that it would increase the weight and lessen the efficiency of their product, but they were confronted with an enormous demand, however unthinking, and yielded to the pressure. Some of the most prominent manufacturers in America have no hesitation in saying that the electrification of gasoline automobiles has been a mistake from start to finish, and that the public is going to pay dear for having compelled the manufacturer to use it against his wishes and against his better judgment. One frequently hears a car owner say, "These things must be all right or the manufacturers would not use them." The car maker has been between the deep blue sea and the other thing, but on the whole he cannot be blamed for following the course of least resistance in making sales.

Suffice it to say that a strong reaction is setting in. Rumor has it that several prominent automobile manufacturers will bring out within the year a new and lighter model and at a lower price, to meet the demand for cars giving greater mileage per gallon of gasoline, greater tire economy, better efficiency and lower operating cost. Many an owner of a 1910 or 1911 model is clinging to his car today because, for efficiency on the road and especially on the hills, he can make the 1912 and 1913 models look foolish.

And right here it is pertinent to say that several manufacturers are now offering their speed roadster models without electric equipment. Why? Because the man who buys this type of car wants power and speed and he usually has to be shown before he buys. To such a man the factory is easily able to prove that he cannot get what he is looking for if he insists upon crippling his engine by the addition of heavy, power consuming electrical apparatus.

It is not generally known, but it is a fact, nevertheless, that the acetylene light with a one-half foot burner has much greater candle power than the 16 to 20 candlepower bulbs now used in electric headlights. The appearance of unusual brilliance afforded by electric headlights is due solely to the fact that the rays of light are concentrated, by means of a parabolic reflector, into one thin, pencil-like beam of dazzling brilliance which does not give the light at the sides of the car, where it is needed in making turns at corners and approaching curbs. The acetylene light with a Mangin mirror lens is so diffused that it illumines not only the path far ahead, but also the road immediately in front of the car and at the sides of the car. It is because of this diffusion of light that the acetylene headlight does not dazzle and confuse pedestrians or approaching motorists, and it is because of this difference that the acetylene headlight has almost wholly escaped, during all its years of use, the adverse legislation which is being aimed at electric headlights by many municipalities.

Light Lamps by Spark

In all this, I have no wish even to insinuate that whatever the known defects of electric light, its convenience has not taken a firm grasp on the public demand. That the push-the-button habit will survive, whether electric lighting survives or not, seems certain. I believe the headlights of the future will be acetylene, turned on and off from the driver's seat and with an electric spark by pushing a button. The early experiments in this method several years ago, were open to criticism because the gas flowed to the lamps at full pressure and sometimes accumulated in the lamps to an objectionable extent before being lit. This has been overcome by attaching a reducing valve to the valve of the tank itself, so that the gas will be delivered to the lamps under only two ounces of pressure. This means, of course, that the operator must wait a few seconds and give the gas at low pressure time to reach the lamps, but this is a minor objection. The electrical part of the equipment is simple and can be operated with four dry cells. It cannot be claimed that this or any other electrical feature is any more infallible, for instance, than the ignition is. But its extreme simplicity makes it many times more reliable than electric lighting ever has been or ever will be, and in any event a temporary derangement of this device does not deprive the driver of light for he can still fall back upon the match, if need be.

In this whole problem, the humble match assumes the same position as the despised starting crank. It may not often be needed, but when it is needed, it is needed badly and it is therefore emergency equipment for any car.

By the same token, whether the side and tail lamps will ultimately contain acetylene burners or tiny electric bulbs operated by small storage battery charged off the car, the coal oil fount is entitled to its place in the lamp for emergency use, at least. One of the queerest manifestations of popular fancy is the retention of the coil oil fount during this season on some of the very high-priced cars and its elimination from the lower-priced cars in connection with electrical systems of less substantial design and poorer installation. This simply goes to show that the public has been so saturated with the notion that electric light could not possibly fail, that the coal oil fount was deemed superfluous. Experience is fast teaching otherwise.

In fact, it may be stated that all the public needs in order to form a correct opinion of electrical apparatus such as is now used on gasoline automobiles, is a little information and a bit of actual experience. The trouble to date has been that the public has eagerly gulped down a morsel of electric theory, to which an extra coating of sugar has been applied by dealers, by some manufacturers, and even by certain good mechanical engineers whose practical knowledge of electricity comprises not only the kind that "isn't so," but also the half-developed kind, which makes a little knowledge dangerous.—R. H. COOMBS—Prest-O-Lite Co.

REPORT OF SPEEDWAY TESTS

Class of Car	H.P. A.L.A.M. Rating	Bore, Inches	Stroke, Inches	Lighting System	Speed per Hour Driving Test	Miles per Gallon Gasoline		Loss of Power Due to Electrical Outfit
						Generator Running	Generator Disconnected	
1. Medium.. Priced....	25.6	4	5	Best known chain driven system	20–25 miles	18.6	21.2	12¼%
2. High Priced	38.02	4.87	6	Same as above	24	16.5	17.9	7.8%
3. Low Priced	25.6	4	4½	Best known fly wheel generator	18	21.4	23.6	9.3%
4. Medium Priced	32.4	4½	5¾	Best known system of lighting, starting and ignition	20	14.8	15.9	6.9%

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Rational Styles for Bodies

THE year 1914 gives promise of recording real progress so far as improvements in bodies are concerned, which will stand in striking contrast to some of the 1913 bodies which are but continuations of the 1912 styles.

The bodies for next year will be distinctive: First the clean running-board is more apparent than ever. With several makers it is clean in reality, not a battery box on it, not a tool box on it and no tire irons for carrying spare tires and rims. Immaculately clean from end to end and above and underneath is the rule. The more general carrying of spare tires and rims on the rear and carrying gasoline tanks on the rear, permitting of extra tool space under the front seat, have made this policy possible.

There is merit to carrying gasoline tanks and spare tires at the rear that has passed unnoticed, namely, in that the riding qualities of the car are improved and the wear on rear tires correspondingly decreased. It is not Utopian to talk of getting greater mileage out of rear tires by carrying these two parts in the rear. It is being demonstrated as an actual fact. Car owners are more and more realizing that it is not all dead weight that determines tire wear, but that the manner in which the back wheels hold the road is a determining factor. When the rear wheels are spinning in the air they wear out the tires by the grindstone action they so successfully carry out. The action of the rear springs is also a factor in determining this wear.

The Eventual Electric System

WHETHER the eventual electric system for starting, lighting and ignition will use three individual units, a starting motor, a generator for battery charging and a magneto or other form of current source for ignition, or whether it will use two units, namely, a magneto or other form for ignition and some combined motor-generator for starting and battery charging, or whether all three functions will be combined in the one instrument, is a problem which is by no means near a solution and yet there is not a wide difference between the various systems.

One year ago, when the electric self-starter was at its zenith, the differences among the systems were wide, but today they are narrowing. Exponents of the individual or three-unit system advance their arguments of light weight, some of them claiming that with three individual units they can give starting motors of much higher efficiency than half the weight of two-unit outfits, in which the starting motor and the generator are combined in a single machine known as motor-generator. With these makers, reduced weight is a major argument.

The ignition system should be independent of the starting and lighting systems and this is true in nearly every form of system. This being the case even in some of the so-called unit systems, perhaps the only interdependence between the ignition and the starting-lighting parts of the instrument being that the ignition part is driven from one of the shafts of the combination, the connection being merely mechanical with entire independence when viewed electrically.

It is questionable if the self-starter concerns could dictate what type of system they would sell, even if firmly convinced as to the relative merits of the three systems. The car manufacturer is a quantity to be reckoned with. He has his whims and whys and wherefores. One maker insists on the starting motor and the charging generator being separate units. His motor layout will not permit of combining the two, even if they were compactly grouped together. In such cases, it is the car manufacturer who dictates and not the starter maker. Other cases are on record for 1914, in which car companies are installing two-unit systems on one model and three-unit systems on another, the motor designer's ability to best incorporate the respective systems being the great consideration in the selection of the system.

There is much chance for argument on one point connected with the starter system and that is whether the electric motor and charging generator can be combined successfully into one instrument or whether, all things considered, better results can be achieved by keeping them separate. At present, weight, simplicity and accessibility are the arguments advanced by those who keep them separate. They claim nearly 50 per cent. weight reduction; they point to an electric lighting system entirely independent of the starting outfit and to a consequently foolproof mechanism. On the other hand, those makers building the two elements, motor and generator, in one unit, point to the unqualified success they are meeting with. They point to simplified driving arrangements and the natural simplification of parts for operating one instrument instead of two.

Hoosier Party Reaches Pacific Ocean

Eighteen of Twenty Who Started Finish 3,400 Mile Run After 27 Days—Last Stretch of Tour Splendid

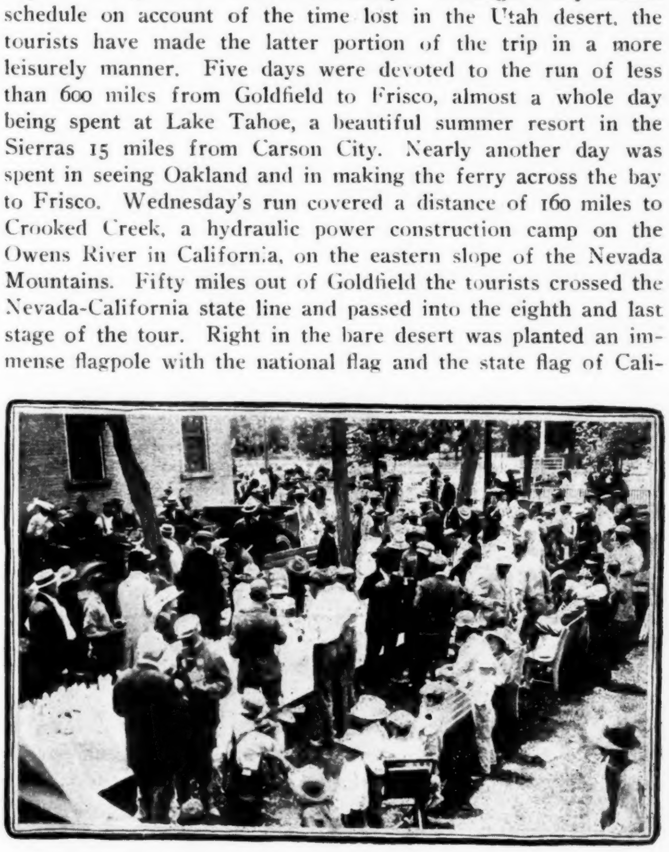
SAN FRANCISCO, CAL., July 29—*Special Telegram*—With 3,400 miles to their credit, eighteen of the twenty cars that left Indianapolis July 1 in the Indiana Manufacturers' tour to Los Angeles reached the coast yesterday afternoon when they rolled into Oakland, Cal., just across the bay from San Francisco. Today, after a tour of Alameda county and a luncheon as the guests of the Oakland Chamber of Commerce, the seventy sunburned transcontinental tourists ferried across to the western metropolis where they will spend Tuesday and Wednesday. Thursday they leave for Del Monte on the last leg of the tour which finishes at Los Angeles August 2. Of the twenty original starters only two failed to greet the Pacific. One of these is the Brown truck, which suffered mishap while assisting one of the escort cars and is now driving night and day in the hope of catching the balance of the tour before Los Angeles is reached. The other car was withdrawn at St. Louis. The two cars which were reported behind at Goldfield, the Pathfinder and Premier Schooner, by valiant work on the part of their drivers rejoined the tour Friday at Lake Tahoe, Cal., on top of the Sierras.

The feature of the run so far is the experience of Walter Weidley, the youngest driver, the 20-year-old pilot of the G. and J truck, a Premier touring chassis with prairie schooner top, carrying supplies of United States tires as well as the heavier luggage of the tourists. This truck accompanied the Premier owners' tour last year. In making up time lost in assisting a local car which was having tire troubles in the desert last Tuesday, Weidley broke a rear axle halfway between Kearney's Ranch and Ely. With him was J. E. Blickert. They were 80 miles from a town or ranch and without food or water and with slight prospect of immediate wayfarers on that desert road. Undismayed, they set to work at once to remove the axle and by night had the damaged piece out so that it could be taken to a shop for repair if the opportunity came. In lieu of their supper they rolled up in their blankets to sleep, but the unearthly cries of the coyotes and the ghost-like shapes of some of the thousand Weidley claims he heard, induced them to take their rest on top of the tires behind a locked wire door. Morning found them searching the barren trail for signs of travelers, but it was not till evening after 18 hours on the desert that a car picked them up and took them to Ely, where repairs were made, quickly followed by a flying trip back to the deserted truck. When it was on its feet again there began the drive of 400 miles to Lake Tahoe, where the tourists had laid over a day. The run was made in 48 hours.

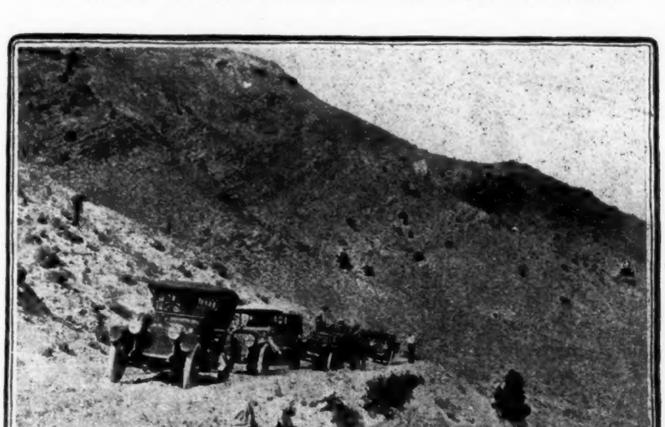
Pathfinder Alone for 15 Hours

Fourteen hours alone on the desert was the experience of Robert Spiegel, driver of the Pathfinder. An overstrain sustained when assisting another car out of a mudhole caused the teeth on the bevel driving gear to give way 40 miles east of Tonopah.

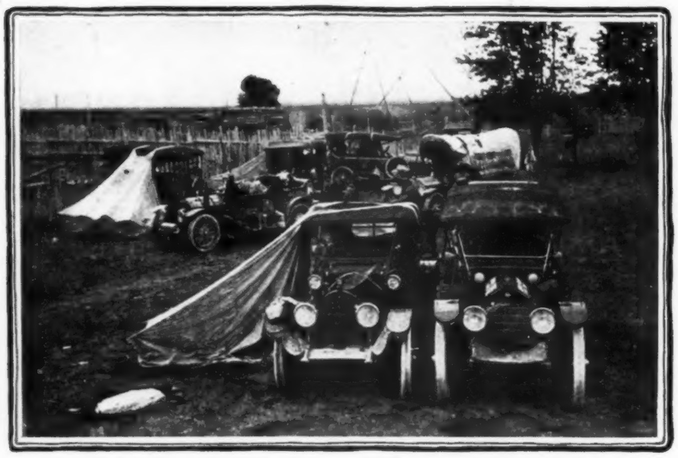
The difficulty was first diagnosed as a broken bearing on the driveshaft and, though the rest of the party in the car went into Tonopah after new bearings, Spiegel elected to stay with the car. Morning arrived with the relief car, but Spiegel had the damaged gear out and it was taken into Tonopah, the teeth ground down to fit and replaced. The Pathfinder was on the way again with only 1 day's delay. A shorter route through the Fallen Sink made very tough going as a rain had made the Dobe almost bottomless. Beyond Reno a cloudburst had destroyed a canyon road completely, and it was necessary to take to the ties. Nevertheless, by night and day driving, the Pathfinder caught the tour at Lake Tahoe and rolled triumphantly to the Pacific with the rest. This is the fourth transcontinental trip for the gear that caused the delay. Although a day behind schedule on account of the time lost in the Utah desert, the tourists have made the latter portion of the trip in a more leisurely manner. Five days were devoted to the run of less than 600 miles from Goldfield to Frisco, almost a whole day being spent at Lake Tahoe, a beautiful summer resort in the Sierras 15 miles from Carson City. Nearly another day was spent in seeing Oakland and in making the ferry across the bay to Frisco. Wednesday's run covered a distance of 160 miles to Crooked Creek, a hydraulic power construction camp on the Owens River in California, on the eastern slope of the Nevada Mountains. Fifty miles out of Goldfield the tourists crossed the Nevada-California state line and passed into the eighth and last stage of the tour. Right in the bare desert was planted an immense flagpole with the national flag and the state flag of Cali-



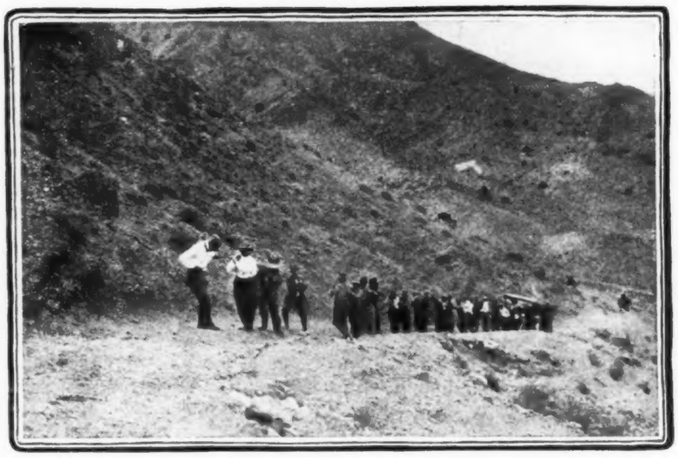
At Spanish Forks, Utah, the tourists stopped for lunch



Steep climb encountered soon after leaving Salt Lake City



At Kearney's Ranch, the automobilists camped in tents



On a steep hill in Utah, one of the cars had to be hauled up

fornia. Below it was a delegation from Bishop, Cal., which escorted the tourists up a 5-mile climb through the White Mountain pass over eyelash roads, through narrow box canyons where the road was the dry bed of the creek and lizards scrambled over the rocks. To the top of Westgard Pass was a 10 per cent. grade 10 miles long from which the snowcapped peaks of the Sierras could be seen glistening in the distance. Then down through rocky gorges over a fine roadbed which was the route of the pony express from the East in the old days. Then a gap in the mountains giving a view of beautifully verdant Owens Valley with Mount Whitney opposite. Bishop and Big Pine are the two chief towns in the valley. A 25-mile drive through the valley brought the tourists to mountain passes again and then through government reserve pine forests with more canyon roads. Dark overtook them at Crooked Creek, a camp in the bottom of a canyon, and here they pitched their tents.

Tourists Pass a Big Geyser

After eating some of the 500 trout caught by five men, who said it had been a bad day for fishing, the Hoosiers started on their next lap to Lake Tahoe, 200 miles to the Northwest. Canyon roads with occasional valleys peopled with Indian sheep and horses to Casa Diable, "The Devil's Castle," so called from a boiling hot geyser, around which sulphur smoke escapes from the rocks. Over Indian Summit, a pass in the Sierras so named by the state in honor of the Hoosier tour. One of the sights on this day's run was Mona Lake, a body of water one-fourth solids and so saline that there is no vegetation on its shore. The rest of the way was a succession of easy passes, and fertile, well-populated, irrigated valleys to Carson City, back on the Nevada side, where it was decided to spend the night The next day the tourists again crossed the state line in the 15-mile climb up King's Canyon to Glenbrook on Lake Tahoe, where the cars were loaded on barges and ferried across the indigo water of the mile-deep Lake Tahoe to Taverns, near Tahoe City, a hostelry of metropolitan size and appointments in the heart of the Sierras. The next day the cars were ferried to another point and after a short, sharp climb to an elevation of 7,400 feet started the long decline of the western slope, beginning at headwaters of the American River, famous for its gold in the days of '49, all the way to Sacramento. Towns themselves reek of gold dug from hillsides and washed from creeks. Placerville and Roaring Camp are two on the route while the far-famed Eldorado is but a few miles up a gulch. Ever since entering California the roads had been much better than any encountered since leaving Denver, but those from Lake Tahoe west were better than any found on the trip. The roadbed was hard and well kept, with granite mileposts all the way. However, when Folsom, 50 miles from Tahoe, was passed, the tourists found themselves traveling on the state highway, a true boulevard all the way to Oakland of fine macadam, well oiled. From Sacramento into Oakland, the next day's run of 130 miles, the tourists averaged 35 miles an hour over a boulevard that cost $15,000 a mile and formed the finish of the Panama-Pacific road race course. This road led through Dublin Canyon, one of the passes by which the Hoosiers crossed their last range of mountains, the Coast range, and rolled for miles into Oakland through solid lines of motor cars, whose horns and passengers shrieked and shrilled and drowned the bands in a cheering, clapping, waving ecstacy of welcome to the cars that crossed the continent.

The hands outstretched to the sunburned Hoosiers meant not alone the welcome of the greatest motoring state in the union to the cars that proved their staunchness in a 3,000-mile journey across the three great deserts and four great mountain systems. It meant to those on the Pacific Coast that a way had been opened; it proved that their state was accessible from the East. That cars, even though under the expert guidance of the manufacturers themselves, found roads which were possible and it only needed the improvement of the least passable stretches to bring the vast bulk of tourists who now either confine their trips to the East or make Europe their playground.

Brilliant as has been the showing of every one of the cars which faced the moving-picture machines to-day after their transcontinental tour, their performance has been far overshadowed in the minds of the people of all these Western states by the fact that the tour to a certain extent determines the route for the proposed transcontinental highway. Carl Fisher's Lincoln Highway project, and the cause of good roads in general in the West, could have received no greater boost by any method. In spite of the discouraging conditions in some portions of the country, every farmer, every hamlet and every city through which the tour passed, were working tooth and nail to be sure of inclusion in the transcontinental highway, and citizens of towns off the route were ready to draw guns to prove their claims to be entitled to that right.

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Two Hundred Club Is Organized

CHICAGO, ILL., July 28—The Two Hundred Club has been successfully launched, and nine owners have qualified for the medals given by E. C. Patterson, of Chicago, for driving 200 miles in 10 hours without a motor stop. Making it still harder, the conditions call for each drive being made in the state from which the owner hails. Thirteen Chicagoans participated in the first formal attempt to qualify for the new club and of these nine were successful. The trip was a bold one, calling for a double-header or rather two attempts in as many days, the route being laid to Monmouth, Ill., and return, 205 miles each way.

Of the thirteen who made the attempt two of them earned extra distinction by making perfect scores each way—Charles S. Hatch in a Stutz and R. O. Evans in an Apperson. For this each will have an extra spoke put in the wheel that constitutes the medals. Those who had to be content with the initial spoke were: W. E. Stalnaker, Premier; E. C. Patterson, Packard; H. E. Patterson, Warren; J. E. Callender, Edwards-Knight; P. E. Ennis, Marmon; Fred J. Robinson, Cadillac; G. Ross Stewart, Ford. The four who failed to go clean were: John W. Maguire, Moon; Burley B. Ayers, Cadillac, and David G. Joyce, Fiat.

The Wolverines of Detroit propose to hold a similar run on August 3. Other trials for the Patterson medals will be held by others in the near future. The competition is not confined to any particular club or locality, and those desirous of securing rules and other information should address E. C. Patterson, Westminster Building, Chicago.

Disbrow and Ferguson Star at Galveston

First 2 Days Develop Thrills—Peugeot and Other Big Racers Excite Interest—Mason Cars Perform Well and Take Many Places

GALVESTON, TEX., July 29—*Special Telegram*—Disbrow, Mulford, Ferguson and Chandler were about balanced in sharing the honors during the first 2 days of the 3-day race meet which opened here yesterday and continued today, five events being run on each day. The fifth event of each day was a 100-mile heat, constituting a third of the 300-mile carnival sweepstakes, which proved in both cases to be very thrilling.

The first five events, run yesterday, included a 10-mile race won by George Dewitt, in the Gila Monster, in 11:17.85. Another 10-mile race was taken by Chandler who drove a Mason Special, finishing 9:58.20. The third event was for 15 miles and Ferguson's Peugeot won it in 11:59.29. A 1-mile, flying-start run was won by Disbrow in the Jay-Eye-See ase in 32.10. Ferguson in the Peugeot finishing at his heels in 35.14. The first 100 miles of the sweepstakes developed Disbrow in the Simplex Zip as the winner, his time being 83:59.48.

On the second day, Chandler's Mason was first in the 10-mile event which opened the day, finishing in 9:09.32. Mulford in a Mason Special was winner of the seventh event of 20 miles, his time being 15:59.00. The eighth event of the program, or third of the day, was a 1-mile, flying start run, which Disbrow again won in the Case in 31.11. The ninth event was a 10-mile race, and Mulford's Mason Special went first over the tape in 9:41.20. The tenth event was the second 100 miles of the sweepstakes run, Ferguson winning it in his Peugeot in 83:57.30.

The mile flying start will be held again tomorrow, as the Warner timing device was in bad shape today, also mile standing start will be run. Finish of 300 mile race, one 10-mile and one 25-mile race will end the program this season.

Under ideal weather and tide conditions, Galveston has launched and almost completed one of the most successful automobile race meets ever held in the Southwest. Among the many star performers who bobbed up during the race, Armour Ferguson was prominent. He was a warm favorite with the spectators in every event in which he was entered. Louis Disbrow, by his persistent pace which eventually brought his little Simplex Zip in for first or second money, also won a place with motor enthusiasts, but not to compare with Ferguson, the latter's genial bearing having made him hosts of friends in the grandstand.

Disbrow Ahead in 300-Mile Race

The 300-mile carnival sweepstakes race which is run 100 miles per day for 3 days, with a time limit of 2 hours for the first 2 days, has grown highly interesting and during today's racing the stands were literally on their toes watching the racers speed by in a blur of smoke and yelling for their favorites. The first 100 miles of this event were easily won by Disbrow in his Simplex Zip, Ferguson failing to get his Peugeot started until the 2 hours had almost passed. When he did start, however, with less than 30 minutes of the allotted time left, he managed to negotiate 35 miles of the journey around the 5-mile course. Today he won easily and would have lapped Disbrow had he not suffered from tire trouble in the sixteenth lap. After losing one lap Ferguson regained the lead in the next five and finished in first place.

Nothing has occurred to mar the happiness of the occasion so far except the collapse of the center section of the grandstand on the opening afternoon, but even in this no one was seriously injured.

The summary for the first 2 days follows:

RESULTS OF THE FIRST DAY

Car	Driver	Time
10-Mile Race		
Gila Monster	Dewitt	11:7.85
Studebaker	Moseley	
Mason Special	Mulford	
10-Mile Race		
Mason Special	Chandler	9:58.20
Case Pirate	Ulbrecht	
Mercer	Horan	
15-Mile Race		
Peugeot	Ferguson	11:59.29
Mason Special	Mulford	
Mason Special	Rickenbacher	
1-Mile Run, Flying Start		
Jay-Eye-See Case	Disbrow	32.10
Peugeot	Ferguson	35.14
100 Miles, First Third of Contest for Carnival Sweepstakes		
Simplex Zip	Disbrow	83:59.48
Mason Special	Chandler	
Case Tornado	Bill Endicott	

RESULTS OF THE SECOND DAY

Car	Driver	Time
10-Mile Race		
Mason Special	Chandler	9:09.32
Case Bullet	Bill Endicott	
Mason Special	Mulford	
20-Mile Race		
Mason Special	Mulford	15:59.00
Peugeot	Ferguson	
Case Tornado	Bill Endicott	
1-Mile Run, Flying Start		
Jay-Eye-See	Disbrow	31.11
Peugeot	Ferguson	34.20
10-Mile Race		
Mason Special	Mulford	9:41.20
Gila Monster	Dewitt	
Studebaker	Moseley	
100 Miles, Second Third of Contest for Carnival Sweepstakes		
Peugeot	Ferguson	83:57.30
Simplex Zip	Disbrow	
Stutz	Lecain	

Wire Wheels in Grand Prix

PARIS, FRANCE, July 21—Yet another indication of the fitness of the modern wire wheel for high speed work is afforded by the result of the recent French Grand Prix. Both the first and the second cars, driven by Boillot and Goux respectively, were equipped with detachable wire wheels. Other cars fitted with this type of wheel were Delage, Itala, Opl and Th. Schneider.

It is of interest to note the opposition meted out to the wire wheel by the French racing authorities at its introduction. In the Grand Prix of 1908 the use of the detachable wire wheel was forbidden by the Automobile Club of France. In the following year this prohibition was withdrawn, with the result that a team of Calthorpe cars equipped with Rudge-Whitworth wheels won the Bennett Regularity Cup.

In 1910, the same race (Coupe des Voiturettes) was won by the late Signor Paul Zuccarelli. His car had Rudge wheels.

In 1911, the Grand Prix des Voiturettes Legeres resulted in a triumph for the same make of wheel, the first four cars at the finish being so equipped. Boillot's win in last year's Grand Prix was also run on Rudge-Whitworth wheels.

A. A. A. officials checking penalties in Glidden tour. Left to right: A. G. Batchelder, C. E. Dutton, Harry Merriman, Laurence Enos, Ralph Earl, H. J. Clark

Group of engineers at the recent Cole convention after a discussion of Series Nine Cole

1913 Exports $40,000,000

Gain Is $39,000,000 Over Figures for 1903—Parts Over $5,000,000

WASHINGTON, D. C., July 29—*Special Telegram*—According to figures issued today by the department of commerce $40,000,000 worth of automobiles and parts thereof were sent out of continental United States in the fiscal year 1913, against about $1,000,000 worth in 1903. These figures of 1913 include $26,000,000 worth of finished automobiles sent to foreign countries, about $2,500,000 worth to Hawaii and Porto Rico, $4,000,000 worth of tires, $2,000,000 worth of automobile engines and $5,250,000 worth of parts other than tires and engines.

It was only in 1902 that the exports of automobiles became sufficient to justify a separate record of this class of merchandise, the figures for that year including the separate parts being less than $1,000,000. In 1907, 5 years later they were but $6,000,000 and in 1910 approximately $12,000,- in value. The number of machines exported to foreign countries in 1913 was 25,000, against 7,000 in 1910, and a little less than 3,000 in 1907, the first year in which the number was stated in the export records of the country. The average price at which they were exported was about $1,700 each in 1907. The 1913 exports included about 1,000 trucks at an average valuation of $1,800 and $24,000. Other machines at an average price of about $1,000.

The imports of automobiles in the fiscal year 1913 were less than $2,000,000 value against over $4,000,000 in 1907 and the average price of those imported in 1913 about $2,300 each against $3,400 in 1907. Canada is the largest purchaser of our automobiles, the 1913 total of cars it bought being 7,212, valued at $9,233,561. England is the next largest customer, with 3,979 cars purchased this year and valued at $3,026,895, while to British Oceania (chiefly Australia and New Zealand), 3,062 cars, valued at $2,914,451, were exported. Other exports included 2,820 cars to South America, valued at $3,165,205; 1,290 to British South Africa, valued at $1,167,371; 849 to Germany, valued at $768,418; 867 to British East Indies, valued at $711,653; 824 to France, valued at $625,795, and 593 to European Russia, valued at $519,076. The average price of those sent to Canada was over $1,200, to South America about $1,100, and to Europe about $800.

Second Warren Sale August 4

DETROIT, MICH., July 29—The postponed public auction sale of the Warren Motor Car Co. will be held on the premises at 10 o'clock on Monday, August 4. The plant was first sold on June 26 to the Rands Mfg. Co., of Detroit, after which the Peter Smith Heater Co. raised the previous bid of $14,800. This second bid resulted in legal complications and the court ordered that the property be again advertised for sale.

Church-Field Factory Closed

DETROIT, MICH., July 28—The Church-Field Electric Co., Sibley, Mich., which for the past year made an underslung type of electric car with a two-speed planetary transmission, has met with financial reverses and has temporarily closed its factory.

Illinois Men Inspect Wayne County

DETROIT, MICH., July 29—Attracted by the growing fame of Wayne County's concrete roads, the Illinois Association of Municipal Contractors spent a day in Detroit under the guidance of County Road Commissioner Edward N. Hines. In order to make them appreciate to the fullest extent the smoothness of the county-laid roads after several years of use, the party was first driven over one of the most wretched stretches of block pavement within the city of Detroit. Under the leadership of Sherman A. Tuttle, of Decatur, Illinois, the party was very enthusiastic over what they saw. It might be added, however, that there are concrete roads and concrete roads.

National Standard Co. Formed

DETROIT, MICH., July 30—*Special Telegram*—The consolidation of the National Cable & Mfg. Co. of Niles and the Cook Standard Tool Co. of Kalamazoo has been completed under the name of the National Standard Co., which will manufacture lighting cable conductors and fixtures, blowers, automobile jacks and steel braid for automobile tires.

Receiver for Muncie Gear Works

INDIANAPOLIS, IND., July 28—E. C. Atkins & Co. of this city have brought suit in the Delaware county circuit court at Muncie to have a receiver appointed for the Muncie Gear Works, one of the largest manufacturers of automobile parts in Muncie. The court has named Eugene Vatte, a retired dry goods merchant, as receiver for the company.

The complaint alleges that on June 1 the company's liabilities were $277,061.80, and that the assets aggregated $204,752.03. The suit was brought on an account due E. C. Atkins & Co. and judgment to the amount of $950 is asked. Thomas W. Warner, of Toledo, O., is president of the Muncie Gear Works, and other large stockholders are D. O. Skinner, Yorktown, Ind.; Dr. W. A. Spurgeon, Muncie, Ind., and Hugh L. Warner, also of Muncie. The company now has contracts in hand amounting to about $400,000.

Cutting Auction on August 5

DETROIT, MICH., July 28—Since the suit started by L. J. Nutty against the Cutting Motor Car Co., Jackson, Mich., the affairs of this company have been carried on by the Security Trust Co., of Detroit, receiver. Under its direction twenty-five cars were completed which wound up the 1913 output. The sale of repair parts during this time has been sufficient to carry the expenses of the receivership. The Cutting company's liabilities are about $400,000 and the assets about $277,000. The latter will be offered at auction on August 5.

Plug Porcelains Dutiable as Printed China

WASHINGTON, D. C., July 28—"Neither the tariff act nor the trade-mark statute contains any express provision, according to which the employment of 'Rajah' printed on a porcelain spark plug can be taken to fix an exemption in favor of such a ware as against similar ware printed with similar names in common use. The spark plugs are dutiable as assessed under paragraph 93, tariff act of 1909."

This is the decision of the United States Court of Customs Appeals in the case of Richard & Co. vs. United States. The articles were returned by the appraiser as printed chinaware, dutiable at 60 per cent. ad valorem, under paragraph 93 of the 1909 tariff act. Duty was assessed accordingly. The importers protested, claiming that the porcelains were not printed ware and that they were dutiable at 55 per cent. ad valorem under paragraph 94. The board of general appraisers overruled the importers' protest and the court of customs appeals affirmed this ruling.

Handley Merges Interests

Company Capitalized at $1,250,000 Formed To Control His American and Marion Holdings

INDIANAPOLIS, IND., July 28—Including all the individual holdings of J. I. Handley, the newly organized J. I. Handley Co., capitalized at $1,250,000, incorporates the Handley interests in the manufacturing and selling companies dealing with the production and distribution of the American and Marion cars. It thus practically includes the corporations now known as American Motors Co., Marion Motor Car Co., American Motors Realty Co., A. & M. Sales & Service Co., all of which are in Indianapolis, as well as the American-Marion Sales Co., New York City, and the American Motors California Co., San Francisco, Cal.

The presidency in both the American and Marion manufacturing companies will be retained by Mr. Handley. V. A. Longaker will continue as chairman and General Manager of the American Motors Co. and take the vice-presidency of the Handley concern. D. S. Menasco, the American Motor Co.'s vice-president, will retain this office, but also become president and general manager of the California concern, with San Francisco headquarters.

President Handley, when asked about the significance of the above move, expressed himself as follows:

"This move is to accomplish two definite purposes. First, it will unify all of my present interests in the above companies. Second, it will departmentize more specifically the work of the various companies. Through definite departmentization we hope to achieve the maximum efficiency in all departments.

"With the sales, advertising and service work entirely removed from the manufacturing companies and thrown into another individual company whose function will be the successful distribution of the product of both the American and Marion companies, we will be able to pursue a more concrete manufacturing program.

"The amalgamation will not effect in any way the individuality of either of the manufacturing companies. Each will have one customer for its product instead of many, and will look solely to the one big customer for successful distribution. On the other hand this one customer, the J. I. Handley Co. will come in direct contact with the many American and Marion dealers.

"The relationship of the Marion dealer to the Marion car will remain just as individual as it is now, and likewse the relatonship of the American dealer to the American car."

DETROIT, MICH., July 29—It is announced by the Sprague-Waldo Mfg. Co. of this city, that it is winding up its affairs with the intention of withdrawing from the manufacture of lamps. It is reported that the property of the concern will be purchased by Gray & Davis, Inc., in order to give increased facilities in filling a large contract for lamps with one of the big Detroit automobile companies.

GRAND RAPIDS, MICH., July 29.—The first meeting of the creditors of the Grand Rapids Motor Truck Co. will be held here September 16.

NEW YORK CITY, July 30—The Gleason-Peters Air Pump Co., Brooklyn, N. Y., has taken over all the rights to the Maco carbureter and is now making preparations for manufacturing it on an extensive scale.

Yosemite Motorable on August 1

WASHINGTON, D. C., July 29—*Special Telegram*—The Yosemite National Park will be opened to automobilists on August 1 and the throwing open of the gates of this wonderland will be the occasion of a big celebration. The fight to have the barriers against the automobile raised was a long one and motorists met reversal after reversal in treating with the department of the interior at Washington. While the Coulterville road will be the first one that will be opened to motor traffic it is most likely that, if no serious mishaps occur, the Big Oak flat and Wawona roads will be opened also in a season or two.

Automobile Securities Quotations

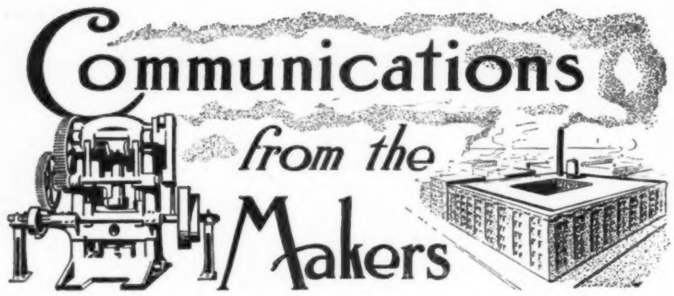
Stock prices this week saw a number of small changes of little import. Goodyear common dropped 12 points and Garford preferred rose $0.07.

	1912		1913	
	Bid	Asked	Bid	Asked
Ajax-Grieb Rubber Co., com	120	..	150	160
Ajax-Grieb Rubber Co., pfd	95	100	94	100
Aluminum Castings, pfd	100	..	97	100
American Locomotive Co., com	42¼	.42¾	31	31½
Chalmers Motor Company, com	..	..	..	112
American Locomotive Co., pfd	108	109½	100	102
Chalmers Motor Company, pfd	..	..	98	102
Consolidated Rubber Tire Co., com	13	14	15	18½
Consolidated Rubber Tire Co., pfd	50	59	60	75
Firestone Tire & Rubber Co., com	275	282	280	282
Firestone Tire & Rubber Co., pfd	105	108	103	104¼
Fisk Rubber Company, com	..	..	..	..
Fisk Rubber Company, pfd	..	..	..	100
Garford Company, preferred	99	101	92	96
General Motors Company, com	33	34	30	32
General Motors Company, pfd	76½	77½	73½	77
B. F. Goodrich Company, com	77¾	78½	30	31
B. F. Goodrich Company, pfd	108½	109	90½	92½
Goodyear Tire & Rubber Co., com	324	330	298	302
Goodyear Tire & Rubber Co., pfd	103½	104½	99½	100¼
Hayes Manufacturing Company	..	97	..	90
International Motor Co., com	22½	25	3	5
International Motor Co., pfd	83	85	18	25
Lozier Motor Company, com	..	..	15	20
Lozier Motor Company, pfd	..	..	..	90
Maxwell Motor Co., com	..	..	3½	4
Maxwell Motor Co., 1st pfd	..	..	28½	29½
Maxwell Motor Co., 2nd pfd	..	..	8½	9¼
Miller Rubber Company	145	150	134	140
Packard Motor Company, pfd	105	106½	95	102
Peerless Motor Company, com	..	..	30	40
Peerless Motor Company, pfd	..	..	85	92
Pope Manufacturing Company, com	30	31	10	11
Pope Manufactur Company, pfd	73½	74½	28	33
Portage Rubber Co., com	..	..	35	42
Portage Rubber Co., pfd	..	..	..	90
Reo Motor Truck Company	10	11½	9	10
Reo Motor Car Company	21	24	18	19
Rubber Goods Mfg. Co., pfd	..	..	100	115
Studebaker Company, com	34	34½	23	24
Studebaker Company, pfd	94¾	95½	81	86
Swinehart Tire Company	96	99	88	92
U. S. Rubber Co., com	..	..	60¼	60¾
U. S. Rubber Co., 1st pfd	..	..	104	104½
White Company, preferred	107½	108½	104	108
Willys-Overland Co., com	..	..	50	60
Willys-Overland Co., pfd	..	..	85	90

Market Changes of the Week

Few changes occurred this week in the markets. The most important was the rise of lead to $4.55 per hundred pounds, due to the activity of refined spelter. The local market for electrolytic copper was dull and weaker and nominally quotable $0.00⅛ lower, although the largest interests made no change in their attitude, but the recent advance has not been based upon sales of electrolytic and there are few buyers even at further concessions. Both Electrolytic and Lake coppers advanced, the former $0.00¼ and the latter $0.00½ per pound. There was a small volume of business in the tin market and a sympathetic lowering in price occurred, when it dropped from $41.60 to $40.80 per hundred pounds, a loss of $0.80. Cottonseed oil rose to $9.57 barrel, a rise of $0.17.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony, lb.	.07½	.07½	.07½	.07½	.07½	.07½	....
Beams & Channels, 100 lbs.	1.61	1.61	1.61	1.61	1.61	1.61	....
Bessemer Steel, ton	26.50	26.50	26.50	26.50	26.50	26.50	....
Copper, Elec., lb.	.14⅝	.14½	.14½	.14¾	.14⅞	.14⅞	+ .00¼
Copper, Lake, lb.	.14½	.14¾	.14⅞	.14⅞	.15	.15	+ .00½
Cottonseed Oil, lb.	9.40	9.52	9.50	9.50	9.40	9.57	+ .17
Cyanide Potash, lb.	.19	.19	.19	.19	.19	.19	....
Fish Oil, Menhaden, Brown	.33	.33	.33	.33	.33	.33	....
Gasoline, Auto, 200 gals.	.22¼	.22¼	.22¼	.22¼	.22¼	.22¼	....
Lard Oil, prime	.95	.95	.95	.95	.95	.95	....
Lead, 100 lbs.	4.35	4.35	4.35	4.35	4.35	4.55	+ .20
Linseed Oil	.49	.49	.49	.50	.50	.50	....
Open-Hearth Steel, ton	26.50	26.50	26.50	26.50	26.50	26.50	....
Petroleum, bbl., Kansas crude	.98	.98	.98	.98	.98	.98	....
Ketroleum, bbl., Pa., crude	2.50	2.50	2.50	2.50	2.50	2.50	....
Rapeseed Oil, refined	.68	.68	.68	.68	.68	.68	....
Silk, raw Italy	....	5.00	....	....	5.00	....	....
Silk, raw Japan	....	3.87½	....	....	3.92½	....	+ .05
Sulphuric Acid, 60 Baume	.90	.90	.90	.90	.90	.90	....
Tin, 100 lb.	41.60	40.85	40.70	40.30	40.70	40.80	— .80
Tire, Scrap	.09½	.09½	.09½	.09½	.09½	.09½	....



New Control for Electrics —New Dumping Body

Drivers of Forward-Drive Electric Cars Demand Wheel Steer with Foot Speed Control—Dumping Apparatus Operates with Oil and Dumps Load in 1 Minute

SEVERAL interesting communications have been received by THE AUTOMOBILE from manufacturers of cars, trucks and automobile and truck tires which are published herewith. The new control for electric passenger cars, by the Broc Electric Vehicle Co., described and illustrated on this page, should prove popular as well as simple and efficient, while the new dumping body, presented by the Kelly-Springfield Motor Truck Co., is apparently a great saver of time in transportation of material and construction work.

Wheel Steer and Foot Speed Control for Electrics

CLEVELAND, O.—Editor THE AUTOMOBILE—The illustration shows an absolutely new and meritorious controlling method now optional on our electrics.

There is a demand on forward-drive electrics for wheel steer with foot speed control in place of wheel or lever steer with hand control, as it is desirable the operator have both hands free for steering.

Our foot control is manipulated from neutral or power-off position by tilting the pedal forward to the speed desired. When the desired speed is obtained no pressure on pedal is required to retain the same. The foot may be removed from pedal. As the reverse is only manipulated when car is at a standstill, reverse lever is located in center of wheel, various reversing speeds are secured in the same as forward speeds by means of pedal. To obtain neutral or power-off position, pedal is tilted to the rear—a further movement in that direction applies the shaft brake. Rear-wheel locking brakes are also furnished.

A preference is being shown by purchasers of forward-drive electrics for wheel steer, and now that a foot speed control is obtainable that is simple and positive of operation and that permits free use of both hands for steering, the popularity of wheel-steer forward-drive electrics is certain to increase.—THE BROC ELECTRIC VEHICLE CO.

New Hydraulic Dumping Body

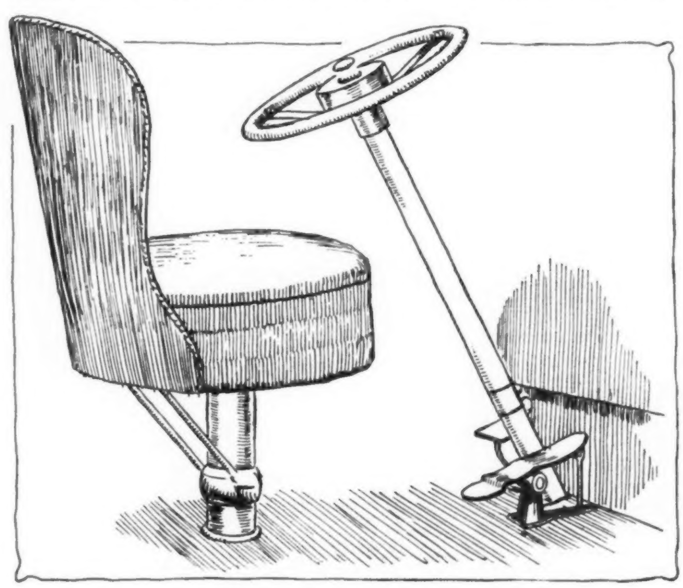
SPRINGFIELD, O.—Editor THE AUTOMOBILE—The Kelly-Springfield Motor Truck Co., Springfield, O., has recently placed on the market a new power-dump body. The workings of this equipment are distinct and different from those of any other power-dump body on the market today.

The new dumping apparatus is of the hydraulic type and operated with oil. The hoisting device is manufactured by the Wood Hydraulic Hoist Co., St. Paul, Minn., but the attachments to the body and power transmitting and operating devices are the products of the engineers engaged in our designing work.

The outfit consists of a large steel cylinder 6 inches in diameter and inside of the cylinder works a conventional type piston with two piston rings on it. The piston is attached to a 2-inch diameter steel piston rod, which extends through the upper cover flange of the cylinder. To the upper end of this piston rod is attached two steel pulleys to guide the two wire ropes. The back end of each of these wire ropes is fastened to the lifting nose of the steel body, the other end is solidly fastened to a strong equalizer, which insures equal tension on each rope. This means that the lifting load is always carried on both ropes.

A gear pump is fastened to the cylinder base and is driven by means of proper size chains and sprockets from an extension of the transmission countershaft. The pump is driven 3 to 1 engine speed. This is done so that the operator will not race the motor when lifting a load. Three hundred revolutions of the motor will lift the 3-ton load and bring the body back to its seat in about 1 minute.

The engaging of the pump mechanism is controlled directly at the driver's right hand on top of the driver's seat; the operator simply disengages his clutch, just the same as he does in getting ready to shift speed gears. In doing this, the countershaft of the transmission is brought to a standstill for a minute and the lever



The new control adopted by the Broc Electric Vehicle Co., Cleveland, O., for its electric passenger cars, showing the wheel steer and pedal control for speed

at the right hand of the driver is pulled in place. The power connection is now accomplished.

The engagement of this extension of the countershaft is locked in a similar manner as the sliding bars of the conventional type sliding-gear transmission is—with spring plungers. These parts are interchangeable with the locks used in the transmission. This positive lock enables the driver to leave his seat with the device engaged until he gets through the operation of dumping the load.

After engaging the power connection the driver may step off, walk back to the machine and open the tail gate, then walk forward to the back seat on the right-hand side of the machine. Here is a hand lever which controls the action of the power hoist proper.

By pushing this lever away from himself the hoist will lift; in vertical position the hoist is at a standstill, and by pulling the lever toward himself the hoist lowers. When the entire body, therefore, is brought back to its seat, the driver is ready to step up to the steering gear, disengage his clutch, pull the power-hoist operating lever at his right hand in neutral position, and is ready to move on with his truck.

One of the greatest advantages over other power dumps is,

that not one part of the hoisting apparatus is moving in any manner, excepting when the hoist is in use.

It is readily conceivable from the above description that the driving of the truck as well as the entire operating of the dumping machinery is but a one man's job and very conveniently done by one man alone. The whole equipment is designed and built with staunchness and simplicity.—KELLY-SPRINGFIELD MOTOR TRUCK Co.

Tires for Electric Trucks and Resistance

AKRON, O.—Editor THE AUTOMOBILE—There arises an additional requirement in tires suitable for electric trucks, beyond those used on gas trucks. Tires on electric trucks must be specially designed to absorb a minimum amount of energy devoted to propelling the truck.

The tire, in performing its function of a shock-absorbing medium, offers resistance to motion in the nature of rolling friction. With the car in motion, it takes power to overcome this rolling friction. Hence it is important that rolling friction be reduced to a minimum, thereby enabling the storage batteries to drive the car for a greater mileage per battery charge. In addition, rolling friction, as observed in the tire, is influenced by many variables, the most important of which are compounds, shape of tread, method of fastening, weather conditions and type of road surface.

Just how these variables or combination of variables affect the efficacy of the tire has not been investigated thoroughly up to this time, but it is certain that the physical properties of the rubber compound have a large share in determining efficiency. To be efficient the rubber must recoil or return to its normal shape after distortion with considerable springiness. In other words, the rubber must be as lively as possible.

In talking about electric tires, the word efficiency is the correct term. The more efficient tires absorb less of the energy, which naturally causes the vehicle to run at a higher rate of speed.

In a recent test at our factory in Akron, O., in which our tires were compared with others, the time over a measured course was less, in favor of our tires, and in addition to that the power consumed was less.—T. H. MCGIEHAN, general manager, Motz Tire and Rubber Co.

Motor Speeds at Over 3,000 Revolutions a Minute

DETROIT, MICH.—Editor THE AUTOMOBILE—That an automobile motor can be made to turn at the almost incredible speed of more than 3,000 revolutions per minute has been definitely established by the automobile testing plant of the Worcester Polytechnic Institute. In fact, the motor on which these tests were made did even better than this supposedly unattainable figure, registering 3,310 revolutions and doing it under conditions approximating as nearly as possible actual duty on the road.

A Studebaker 20 chassis, stock in every respect, and identical with the 30,000 of this type in daily use for passengers and delivery, was the medium employed by Professor David C. Gallup, under whose direction the tests were made. The motor was scientifically tuned for speed, requirements of flexibility, quietness and reserve strength being cast aside. Prior to the laboratory tests this chassis, fitted with a scientific wind-splitting body, registered over 80 miles an hour on road tests.

A power-registering device, attached to the rear wheels, yielded some interesting data. The car developed its catalog rating of 20 horsepower at the unusually low figure of 1,120 revolutions. It delivered 30 horsepower at 1,900 revolutions, and at the wonderful maximum was showing more than 36, equivalent to a speed of 89 miles an hour. Beyond the 3,300 mark the power curve began to show a drop, the limit having been reached.

The Studebaker engineers have, on several occasions, secured 3,100 revolutions under load, and all experts have known of the sensational speed of which this motor was capable, but the unprejudiced nature of the test at Worcester "Tech" and its sensational result cannot fail to create amazement throughout the realm of motor engineering.

In this connection it is interesting to note that the Studebaker engineers have always conformed catalog ratings of their cars very closely to the piston-displacement rules of the American Automobile Association which makes no allowance for extreme motor speeds but rates 20-horsepower cars at 160 cubic inches; "thirties" at 230; "forties" at 300 and "fifties" at 450, a unit of 7.5 cubic inches per horsepower being thus implied. Not only the Studebaker 20 motor, but also the present 25, 35 and Six conform very closely to this generous maximum, computed on the only standard which has ever proved universally acceptable.—PAUL HALE BRUSKE, the Studebaker Corporation.

Over-Size Tires Sometimes as Bad as Light Ones

DETROIT, MICH.—Editor THE AUTOMOBILE—In numerous automobile advertisements today you will find the statement that the car is equipped with over-size tires. This has assumed the proportions of a fad. Every motor-car advertisement writer seems to think he must use this term. It seems not to make any difference with what size of tires his car is equipped. He uses the term anyway. It sounds to him like good "selling talk." As a matter of fact, a great many cars have always been under-tired. And if any change has been made it is merely to put on them the size of tire that they should have had in the first place. Cars should be equipped with tires that will not only carry the weight of the car, with all tanks filled, extra tires in place, and the full number of passengers in the car that it is built for, but also provide for large margin of over-weight. To equip a car with tires larger than it requires, adding extra cost, is just as poor engineering as to equip it with tires that are too light. There is only one right size.—HUDSON MOTOR CAR CO.

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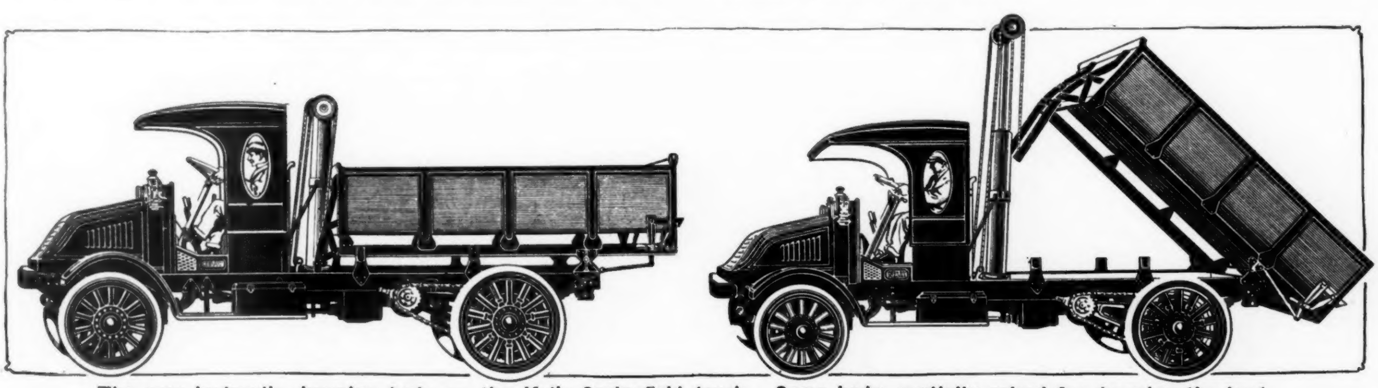
INDIANAPOLIS, Ind.—Editor THE AUTOMOBILE—A National car was used by the Prest-O-Lite company here in tests to determine the mileage per gallon of gasoline with the generator attached.

A speed of 25 miles per hour was maintained in these tests, which were made by diconnecting the main gasoline line, and attaching direct to carbureter a special line and testing can, containing a measured gallon of gasoline.

One day the car made 16.9 miles on 1 gallon and the next day it made 16.5 miles per gallon, and again 16.7 miles per gallon.—National Motor Vehicle Co.



The new hydraulic dumping body on the Kelly-Springfield truck. Same body, partially raised for dumping the load

PLAN Automobile Factory—St. Paul, Minn., is to have a new $150,000 automobile factory in the Midway district this fall if plans of L. C. Erbes, capitalist and real estate dealer, work out. Mr. Erbes has been in consultation with J. E. Pfeffer and E. H. Mars of the Continental Engine Co. of Dallas, Ill., who were with him on the Glidden tour, and the decision to build the new plant there was reached during the tour. The new plant as outlined by Mr. Erbes will occupy 150,000 feet of floor space, and will employ 250 men.

Reliance Factory in Pontiac—The Reliance Motor Truck Co., part of the General Motors Co., is reported to be planning to move its business to Pontiac, Mich.

McGraw Tire Builds—The McGraw Tire & Rubber Co., East Palestine, O., will erect a four-story factory and will increase the number of employes from 500 to 1,500.

Western Implement Company's Factory—The Western Implement & Motor Co., Cedar Rapids, Ia., is having plans prepared for the erection of a factory, 100x300 ft., at that city.

Battle Creek Co. Closing—The Castle Lamp Co., Battle Creek, Mich., will remove to Toledo, O., its assets having been bought by J. N. Willys. Two hundred men will be out of work as a result.

Uehlein's Office at Factory—Due to the increase in the business of the Universal Motor Truck Co., Detroit, Mich., the president, George Uehlein, has deemed it advisable to move his office from Milwaukee, Wis., and to establish himself permanently at the Detroit plant.

Metz's Addition—The addition which will be erected by the Metz Co., Waltham, Mass., manufacturer of automobiles, will be 200 by 200 ft., and will be used for manufacturing. The building will contain all the heavy machinery, part of which will be moved from the present plant. The building will not be ready for occupancy before November 1.

Ward Leonard Adds—The Ward Leonard Electric Co., Bronxville, N. Y., states that the addition, recently started, is nearing completion, on the northeast wing off the factory. This will greatly facilitate the company in handling the increase of business and will enable it to triple its present output. The addition will also relieve its present congestion in the installation department.

To Erect Plant—G. T. Noble and J. P. Biederman, acting for the Chicago Carriage & Timing Co., manufacturer of automobile bodies, have acquired property on South Michigan avenue, Chicago, Ill., for a reported consideration of $40,000. The lot has an area of 83.33x197 ft. It is to be improved with a four-story brick structure to cost about $85,000, which will be occupied by the company.

Start Work on Ford Plant—Work has started on an eight-story addition to the Ford Motor Co., Detroit, branch building at Woodward avenue and Grand boulevard that will cost about $330,000. The old building will be built up four stories, making it eight stories in all, and on the rear of the building eight stories will be built, 220 ft. long by 97.5 ft. wide. At the Ford plant in Highland Park work will soon be started on two new buildings, each six stories high and 800 ft. long by 60 ft. wide, with two inclosed courts the same length and 40 ft. The construction is of reinforced concrete.

Whitney's Concrete Addition—The Whitney Mfg. Co., Hartford, Conn., is making preparations for another modern concrete addition to its factory. The addition is to be 60 ft. wide, 112 ft. long, and four stories high, making an addition of 26,880 sq. ft. of floor space. The recently completed two-story building, 50x180 ft., is being equipped with machinery, etc. The company has sold its 20-in. water tool grinder to the Taylor & Fenn Company, Hartford, Conn., and will now devote its entire attention to the manufacture of high-grade driving chains, keys and cutters for the Woodruff system of keying, and handed milling machines.

Plans for Nashville Plant—Plans are under way by capitalists from the West to locate in Nashville, Tenn., another automobile plant. The gentlemen interested in promoting this new project are now in the city and local men of means have become interested and are lending their aid in securing the necessary financial aid and a factory site. It is expected that the plans of the new company will be made public within a few weeks. The general plan of these promoters is similar to that adopted by the Evans Motor Car Co., which has purchased 108 acres on the Gallatin Pike, 6 miles from the city, which is now being improved by the opening and grading of new streets preparatory to putting lots on the market. In this manner new concerns are enabled to secure factory sites and to finance their project through the sale of residence lots from the surplus acreage. The river transportation afforded by the city was a great attraction to the Evans people, and the same attraction will aid in bringing many more large concerns there if it is seen that the advantages of the city are enhanced in value by a hearty and co-operative welcome.

The Automobile Calendar

Shows, Conventions, Etc.

October 13........Philadelphia, Pa., National Fire Prevention Conference. Philadelphia Fire Prevention Commission.
Oct. 27-28........Chicago, Ill., Convention of Electric Vehicle Association of America.
Dec. 9-12.........Philadelphia, Pa., Annual Convention of American Road Builders' Association.
Dec. 11-20.........New York City, First International Exposition of Safety and Sanitation, under the auspices of the American Museum of Safety.

Race Meets, Runs, Hill Climbs, Etc.

July 26-31.........San Antonio, Tex., Tour, San Antonio Automobile Club.
July 29-31.........Lincoln, Neb., Reliability Run, Lincoln Automobile Club.
July 31............Philadelphia, Pa., Truck Parade, *Philadelphia Inquirer.*
August ....Des Moines, Iowa, Reliability Run, Iowa State Automobile Assn.
Aug. 5............Kansas City, Mo., Sociability and Endurance Run from Kansas City to Colorado Springs, Col., Kansas State Automobile Assn.
Aug. 3............Wichita Falls, Tex., Track Race.
Aug. 7............Amarillo, Tex., Track Race.
Aug. 9............Brighton Beach, N. Y., Track Race, Motor Dealers' Contest Association.
Aug. 9............Santa Monica, Cal., Road Race, Santa Monica Road Race Committee.
Aug. 10...........Pueblo, Tex., Track Race.
Aug. 12...........Kansas City, Mo., Reliability Tour, Kansas State Automobile Assn.
Aug. 15-16........Denver, Colo., Track Race.
Aug. 18-20........Milwaukee, Wis., Fourth Annual Wisconsin Reliability Tour, under the auspices of the Wisconsin State Automobile Assn.
Aug. 25-28........Houston, Tex., Reliability Run, Houston Auto Club.
Aug. 25-30........Cleveland, O., Midsummer Show, Forest City Fair, Cleveland Automobile Show Co.
Aug. 29-30........Elgin, Ill., Elgin Road Races, Elgin Road Race Assn.
Aug. 30-Sept. 6....Chicago, Ill., Reliability Run, Chicago Motor Club.
September ....Grand Rapids, Mich., Tour, Grand Rapids Auto Club.
Sept. 1............Columbus, O., 200-Mile Track Race, Columbus Automobile Club.
Sept. 8-13.........Chicago, Ill., Around Lake Michigan Run, Chicago Motor Co.
Sept. 9............Corona, Cal., Track Race, Corona Automobile Assn.
Sept. 12...........Canfield, O., Track Meeting, Canfield Fair Assn.
Sept. 13...........Covington, Ky., Track Meeting, Cincinnati Automobile Club.
Sept. 13...........Grand Rapids, Mich., Track Races, Grand Rapids Automobile Club.
Sept. 20-21........Detroit, Mich., Track Races, Michigan State Fair.
Nov. 4-5...........El Paso, Tex., Road Race to Phoenix, Ariz.
Nov. 4-5...........Los Angeles, Cal., Road Race to Phoenix, Ariz.
Nov. 4-5...........San Diego, Cal., Road Race to Phoenix, Ariz.
Nov. 6.............Phoenix, Ariz., Track Meeting, State Fair.
Nov. 24............Savannah, Ga., Vanderbilt Cup Race, Motor Cups Holding Company.
Nov. 27............Savannah, Ga., Grand Prize Race, Automobile Club of America.

Foreign

July 15-30.........London, Eng., Olympia Heavy Motor Vehicle Show.
Aug. 28-30.........Ghent, Belgium, Institute of Metals, Annual Autumn Meeting, Ghent International Exhibition.
Sept. 21...........Boulogne, France, 3-Litre Race.
Sept. 25...........Isle of Man, International Stock Car Race.
October 17-28......Paris, France, Automobile Show, Grand Palais, 10 days.
November ....London, Eng., Annual Automobile Exhibition, Olympia.

The Week in the Industry

Engineer — Dealer — Repairman — Garage

OVERLAND ESTABLISHES BRONX STATION—The Willys-Overland Co., Toledo, O., manufacturer of the Garford automobiles and trucks, will establish a factory in the Mott Haven section of the Bronx, N. Y. City. It is to cover the entire block front in the south side of 150th street from river to Gerard avenue, and will be 200 by 148 feet in size. The site has been leased from Henry Lewis Morris, who will erect a two-story fireproof garage, which the company will use as a branch factory and service station. The building will have a floor area of 50,000 square feet. For the building and site, which the company has taken for 21 years, the company will pay an aggregate net rental of about $275,000.

WOOD SALES MANAGER—H. A. Wood has been appointed sales manager of the Big Four Auto Co., of Los Angeles, Cal.

SLADE IN NEW OFFICE—A. J. Slade has re-established his consulting engineering office at the Times Bldg., 42nd street and Broadway, New York City.

TAKES PHARIS AGENCY—The Pharis Tire & Rubber Co., 121 East Gay street, Columbus, has taken the central Ohio agency for the Acme line of tires.

VANDERPOOL FOREIGN DISTRIBUTOR—A. C. Vanderpool has been appointed by the Wahl Motor Co., Detroit, Mich., to act as foreign distributor for its new product.

TAKES AGENCY FOR PROVIDENCE—Albert E. Goody, who has a big bicycle business in Providence, R. I., and surrounding territory, has taken the agency there for Oilzum products.

BUS LINE TO GETTYSBURG—The Chambersburg Auto Co. has inaugurated automobile service between Caledonia and Gettysburg, Pa. Six automobiles have been placed in service.

TAKES OVER TIRE AGENCY—The L. S. Hall Rubber Co., Philadelphia, Pa., has taken over the agency of the McNaull Auto Tire Co., for eastern Pennsylvania, New Jersey and Delaware.

YOUNG FACTORY MANAGER—The International Motor Co., New York City, has appointed T. G. Young manager of its factory branch for the distribution of Mack, Sauer and Hewitt trucks.

APPOINTED STUDEBAKER ENGINEER—Wm. MacGlashan, electric truck engineer, at South Bend, Ind., has been appointed pleasure car engineer, with headquarters at plant 10, Detroit, Mich.

SCHEU GOES TO NEW YORK—Edward C. Scheu, for several years in charge of the New England district for the Invader Oil Co., has been promoted to have charge of the New York City district.

HARTFORD SUSPENSION ADDS TWO—To the list of manufacturers including Truffault-Hartford shock absorbers as regular equipment, were added recently the names of the American and the Marion.

HOOD EMPIRE COMMERCIAL MANAGER—W. C. Hood has been appointed commercial manager of the Empire Automobile Co., Indianapolis, Ind. He will supervise the sales and advertising policies of the company.

EVERETT THE NEW MANAGER—Joseph M. Everett, formerly with the Diamond and Walpole tire branches in Boston, has been appointed manager of the Boston branch of the Dayton Tire Co., to succeed E. C. Newcomb, who has been promoted.

ALARM STARTS MOTOR—The chief of the Manchester, Conn., fire department which consists largely of motor apparatus, has devised a means of starting the motors immediately an alarm of fire is sounded. The scheme has been found to be a time saver.

ENLARGING HIS PLANT—W. H. Pembroke of Malden, Mass., who has the agency for Ford and Hudson cars, has just given out the contract to enlarge his service station and garage so that it will accommodate 100 cars. The work will be finished in the Fall.

FRANKLIN MOVING—The Franklin Motor Car Co. is preparing to move to its new quarters, 1017-1019 North Eutaw street, Baltimore, Md., where it will have show rooms, service department and garage, the company not having had a service department before.

COLUMBUS TYRIAN AGENT—The Guarantee Tire & Repair Co. is the name of a new concern which operates at 149 North Fourth street, Columbus. The company is local agent for the Tyrian tire, made at Andover, Mass. Jack Reed is general manager.

BEIJER IS TRANSMISSION INVENTOR—Arthur Beijer is the inventor and designer of the Hydraulic Transmission manufactured by the Beijer Hydraulic Transmission Co., Inc., Stevens Point, Wis. A. P. Beijer is vice-president and V. P. Atwell, secretary and treasurer.

CHANGES TO INTERNATIONAL—Walter L. Mitchell, for 2 years with the Alvan T. Fuller Co., Boston, Mass., agent for the Packard, has followed his co-worker, Norman H. Halliday, over to the International Motor Co.'s Boston branch, and he will have charge of the city sales.

GONE TO PIERCE-ARROW—Harry W. Mayo, for several years identified with the Peerless Motor Car Co. of New England, has resigned to accept a position with the J. W. Maguire Company, agents for the Pierce-Arrow in that city, and will travel through New England for the company.

GOODYEAR SERVICE STATION ESTABLISHED—A service station exclusively for the use of users of Goodyear tires will soon be opened in Cleveland. The Goodyear Tire and Rubber Co. of Akron, O., has leased a three-story building at 5213 Windsor avenue, which will be devoted to this purpose.

KELSEY STOCK SOLD—The stock of automobile parts and accessories owned by the Kelsey Motor Co., of Springfield, Mass., that went out of the gasoline car business recently to devote its time to electric vehicles, has been purchased by the Auto Parts & Repair Co., of 88 Birnie avenue.

DETROIT MOTORDROME AS HOST—The management of the new Detroit Mich., Motordrome has been acting as host to the Detroit motor-car workers on each Saturday night during the Summer. Last week 1600 employees and officials of the Timken-Detroit Axle Co. attended the motorcycle races.

NEW FEDERAL TRUCK BOOK—The Federal Motor Truck Co., of Detroit, Mich., has issued a new book known as the Federal Blue Book. This book not only describes and illustrates the construction of Federal trucks but deals with the troublesome problems which confront the business man in freight transportation.

MUST HELP ON ROADS—By a proclamation from the Governor of Alabama, Aug. 14, 15 and 16 have been set aside as good roads' days. During this period every citizen is asked to give labor or its equivalent in building up such sections of roads as will be of greatest good to the greatest number. The feature is to be made an annual one.

AUTOMOBILE HARVESTING MACHINE—The American Mfg. Corp., organized some time ago in Indianapolis, Ind., is developing an automobile harvesting machine and general utility tractor, which is to be placed on the market shortly. It is claimed that the machine will plow, harrow, drill, reap, mow and haul grain and other farm products to market.

WHITE CO.'S BIG TAXICAB SALE—The biggest taxicab sale in years was announced recently by the White Co., Cleveland, O., when it reported the signing of contracts for the purchase of sixty-three White taxicabs by the Taxicab Co., of California. With the added equipment the taxicab company will have a completely standardized installation of 82 White taxicabs.

NEW AUTOMOBILE INSURANCE CHARGES—The New York City Fire Insurance Exchange has promulgated a new ruling, through its rate committee and manager, governing automobile charges in specifically rated risks and the rating of automobile occupancies to harmonize with changes made in automobile charges in minimum rated risks, as of June 11, 1913.

A. L. A. DEVISES GOOD PLAN—The Automobile Legal Association of Boston, Mass., has just devised a new plan that has already worked out very well. Its officers have asked the members to report to the headquarters at 6 Beacon street, Boston, when they lose or find any article. During the first week several articles were restored to owners through the new method.

CHANGES SELLING PLAN—From the Lozier Motor Co., Detroit, Mich., comes the announcement of a change in its selling plan. It has been decided to discontinue, as part of the factory organization, the branches in Chicago, Boston, Philadelphia and San Francisco, sales manager, Paul Smith, that the best interests of customers can be served by capable agents, and that with the class of dealers required by the Lozier in handling their cars there is nothing in favor of the factory branch system.

FIRE IN BOSTON PREMIER BRANCH—Fire broke out early in the morning on the top floor of the building used by the Premier Motor Car Co. as its New England branch, at 640 Beacon street, Boston, Mass., recently, and before the firemen extinguished the flames three cars were badly damaged and the floor of the repair shop was burned, necessitating repairs. It is estimated that the loss will reach $10,000 on cars and building.

LIMITS STANDING TIME—To relieve congested traffic conditions in downtown districts an ordinance has been presented to the common council, Grand Rapids, Mich., to amend the vehicle ordinance to provide that no vehicle shall be left standing at the curb for more than 30 minutes at a time and that no vehicle shall be parked at the curb at a point where passengers board or alight from street cars. The ordinance at present allows vehicles to stand at the curb 1 hour.

NEW USE FOR MIRRORS—Mirrors at road crossings for the use of warning automobiles are commencing to be used in England, it is stated, and the results are very good. They are being put in places where the crossings are specially dangerous, and the use of large mirrors allows the driver to see the reflection of cars which are coming in other directions. The method will probably be extended in the future, as it is likely to avoid many accidents and will be well worth the small cost of putting in.

ALLOWED HIGH-POWERED LAMPS—Birmingham, Ala., after trying out a traffic ordinance for several weeks, has passed the measure after making a few changes shown to be advisable after the trial. Motor cars are allowed to use high-powered lights but the interurban street cars will not be permitted to use arc headlights within the city limits. Confusing street car lights for automobile lights has caused several accidents there. The council in Birmingham attempted to apply all the good features from the ordinances in force in the larger cities.

PEERLESS CHOOSES NEW SITE—The section in the vicinity of 23d and Chestnut streets, Philadelphia, Pa., has been selected by the Peerless Motor Car Co. R. W. Cook, general manager of the company, selected the Chestnut street site because of its excellent location at the heart of the new motor car center and because of the greatly improved railroad facilities that are available there. Plans for the new building were accepted some time ago and construction work is already under way, and it will be completed for occupancy by November 1.

APPLE ELECTRIC SERVICE FACILITIES—The Apple Electric Co., Dayton, O., announces that it has completed negotiations whereby service and installation stations for Aplco devices will be opened immediately in the principal cities. The various branches will also carry stocks of Aplco devices, and will act as distributing stations for Aplco products, both retail and wholesale, except that the negotiations between the company and manufacturers of automobiles will be conducted through special representatives of the company from the factory.

BIGGEST MIDDLE WEST GARAGE—J. J. Jones, of the Jones Auto Exchange, Wichita, Kan., has decided to erect in that city a six-story garage. It will be the most complete and largest automobile structure in the Middle West, possibly excepting the Spence Automobile Co.'s building in Minneapolis, Minn., which is eight stories high, but only 75 feet front, while the Jones building will have a frontage of 100 feet. The building will be headquarters for the Wahl car. It will be 100 feet front and 140 feet deep. It will have a basement and six stories.

Recent Incorporations in the Automobile Field

AUTOMOBILES AND PARTS

BOWLING GREEN, O.—Modern Motor Car Co.; capital, $10,000; to deal in automobiles. Incorporators: W. P. Abbey, D. I. Ladd, R. E. Ladd.

BROOKLYN, N. Y.—Rambler Motor Car Co.; capital, $5,000; to deal in automobiles. Incorporators: G. R. Ruckert, B. F. Donnocker, J. B. Smith.

BUFFALO, N. Y.—Steinbrenner Carbureter Co.; capital, $100,000; to manufacture carbureters and automobile and motor trucks. Incorporators: J. T. Driscoll, J. M. Hoen, W. J. Steinbrenner.

CARROLLTON, KY.—Wood Auto and Machine Co.; capital, $10,000; to repair and deal in automobiles. Incorporators: J. P. Monnyhan, E. C. Smith, P. B. Gaines.

CHICAGO, ILL.—Automobile Service Co.; capital, $30,000; to deal in automobiles. Incorporators: William Friedman, E. J. Ader, Lillian Brabrandt.

CHICAGO, ILL.—Siegmund-Bailes Truck Co.; capital, $2,500; to deal in automobiles and motor trucks. Incorporators: George Siegmund, H. L. Bailes, Mae Gasser.

CLEVELAND, O.—Commercial Auto Body & Mfg. Co.; capital, $50,000; to manufacture automobile bodies. Incorporators: J. J. McElligott, N. F. Larsen, L. S. Fuller, F. L. Fuller, H. S. Fuller.

CLEVELAND, O.—Original Auto Polo Co.; capital, $25,000; to manufacture automobiles for auto polo. Incorporators: R. A. Hankinson, R. B. Worthington, A. E. Bernstein.

INDIANAPOLIS, IND.—J. I. Handley Co.; capital, $1,250,000; to deal in automobiles. Incorporators: J. I. Handley, V. A. Longaker, D. S. Menasco.

MAYSVILLE, KY.—Gardner Bros. Co.; capital, $2,000; to deal in automobiles. Incorporators: J. H. Gardner, E. M. Gardner, Thomas Malone.

NEW YORK CITY—Steinbock Engineering Co.; capital, $250,000; to manufacture automobiles and motors. Incorporators: H. P. Steinbock, A. B. Gormully, F. C. Sievers.

NEW YORK CITY—Twombly Car Corp.; capital, $300,000; to manufacture motor vehicles. Incorporators: D. Stuart Dodge, W. I. Twombly, H. W. Jessup.

ORANGE, CONN.—Cameron Mfg. Co.; capital, $1,000,000; to manufacture and deal in automobiles and boats. Incorporators: F. S. Corley, T. M. Steele, H. F. Parmelee.

RICHMOND, VA.—City Auto Corp.; capital, $15,000; to deal in automobiles. Incorporators: W. H. Wysor, R. L. Gardner.

SEATTLE, WASH.—Van Brunt Motor Car Co.; capital, $75,000; to deal in automobiles and supplies. Incorporators: D. C. Van Brunt, H. W. Doherty.

WASHINGTON, D. C.—City Automobile Co.; capital, $3,000; to buy and sell automobiles. Incorporators: G. H. Greenwood, L. G. Helphenstine, L. A. Kennedy.

GARAGES AND ACCESSORIES

ALBANY, N. Y.—Capital City Vulcanizing Co.; capital, $1,000; to repair and deal in automobile tires. Incorporators: J. M. Giblin, J. J. Cregan, D. H. Cregan.

BROOKLYN, N. Y.—Bridge Plaza Garage Co.; capital, $1,000; general garage business. Incorporators: Charles Baumann, Lee Costello, Norman Murray.

CLEVELAND, O.—General Auto Parts Co.; capital, $1,000; to manufacture metal products and specialties. Incorporators: F. C. Walsh, M. Kepke, William Radtke, C. R. Cross, J. F. Johnson.

CLEVELAND, O.—Delivery Co. of Cleveland; capital, $10,000; to do a general cartage and delivery business. Incorporators: G. H. Hull, J. T. Scott, M. G. McAleeman, W. D. Turner, C. Myers.

CLEVELAND, O.—Euclid Auto Livery Co.; capital, $10,000; general automobile livery. Incorporators: F. A. Poole, E. L. Lansing, B. J. Peck, W. J. Warmington.

CHICAGO, ILL.—Motor Tire Sales Co.; capital, $2,500; to deal in automobile accessories. Incorporators: Frank Hutchinson, Emma Rossing, A. S. Dwyer.

CHICAGO, ILL.—Stewart Auto Accessories Co.; capital, $1,500; to deal in accessories. Incorporators: F. W. Stewart, L. L. Kennedy, J. A. Steven.

INDIANAPOLIS, IND.—Brown-Rowan-Buck Auto Sales Co.; capital, $40,000; to deal in automobile accessories. Incorporators: W. I. Brown, J. V. Rowan, A. W. Buck.

MAYVILLE, WIS.—Badger Auto Co.; capital, $20,000; to operate a garage. Incorporators: R. A. Ruedebusch, F. J. Lang, Anton Lang.

MIDDLETOWN, N. Y.—The Talking Horn Co.; capital $10,000; to manufacture automobile horns. Incorporators: N. C. Oddo, T. H. Bingham, F. W. Morgans.

MILWAUKEE, WIS.—Grove Street Garage; capital, $5,000; general garage business. Incorporators: H. A. Keech, E. A. Ringel, Clarence Salentine.

MOUNT JEWETT, PA.—Dewitt Muffler Co.; capital, $30,000; to manufacture, sell and deal in and with the patented C. E. Dewitt machine muffler. Incorporators: A. O. Downey, R. B. Rupert, C. E. Dewitt.

NEW YORK CITY—Eclipse Garage Co.; capital, $6,000; general garage business. Incorporators: T. J. Cardiff, W. A. Builder, J. Mano.

NEW YORK CITY—F. W. Young Co.; capital, $15,000; to repair automobiles. Incorporators: W. J. Cahill, W. H. Brantigam, F. W. Young.

NEW YORK CITY—Metropolitan Public Motor Corp.; capital, $1,000; motor conveyance. Incorporators: J. O. Tryon, E. A. Mathews, C. R. Olena.

NEW YORK CITY—Prest-O-Lite Co.; capital, $380,000; to manufacture acetylene gas systems. Incorporators: C. G. Fisher, J. A. Allison, S. M. Colley.

PITTSBURGH, PA.—Latrobe Automobile Turntable and Jack Co.; capital, $100,000; to manufacture and sell machinery of all kinds and appliances relating to turntables and jacks. Incorporators: John Gilligan, Thomas Griffin, W. B. W. Bryan, N. L. Bogan, C. J. Jacobs.

PITTSBURGH, PA.—Pittsburgh Tire Protector Co.; capital, $5,000; to manufacture tire protectors. Incorporators: J. A. Martin, Patrick Cousins, Thomas Skarry and Anna O'Shea.

POUGHKEEPSIE, N. Y.—Wright Storage Battery Co.; capital, $100,000; to manufacture and deal in storage batteries. Incorporators: R. H. Raphael, M. E. Wainwright, R. H. Hammond.

PORTLAND, IND.—Auto Supply Co.; capital, $10,000; to deal in automobile supplies. Incorporators: R. D. and Nina G. Wheat, F. H. Mark.

RACINE, WIS.—Wisconsin Cylinder Foundry Co.; caital, $25,000; to establish a grey iron foundry for the production of engine castings for motor manufacturers. Incorporators: Knut Tomsen, John Holz.

ROCKY HILL, N. J.—Rocky Hill Auto Bus Co.; capital, $10,000; general automobile bus line. Incorporators: R. F. Stryker.

ST. LOUIS, MO.—Amazon Rubber Co.; capital, $100,000; to manufacture rubber goods of all kinds. Incorporators: W. H., E. F. and H. F. Schewe, C. G. Schwartz, Andrew Peterson.

SYRACUSE, N. Y.—Bennett's Garage, Inc.; capital, $5,000; general garage business. Incorporators: G. E. Brainard, S. B. Johnson, G. W. Bennett.

TOLEDO, O.—Kolo Carbureter Co.; capital, $10,000; to manufacture and deal in internal combustion engines. Incorporators: Jacob Brunn, F. M. Bostater, S. E. Butler, W. L. Bergman, C. M. Kelly.

WILMINGTON, DEL.—Chesterhill Gasoline Co.; capital, $5,000; to acquire oil and gas lands and develop and market the same.

WILMINGTON, DEL.—Mecca Automobile Society; capital, $50,000; to carry on an automobile society. Incorporator: C. M. Miller.

CHANGES OF NAME AND CAPITAL

AKRON, O.—Akron Gear & Engineering Co.; capital increased from $20,000 to $50,000.

BALTIMORE, MD.—Cole Sales Co.; change of name to the Poehlmann Automobile Co.

CHICAGO, ILL.—Harbeck Motors Co.; change of name to the Leon Victor Engine Co.

CHICAGO, ILL.—Harbeck Motors Co.; capital increased from $50,000 to $250,000.

LEIPSIC, O.—American Foundry Co.; change of name to the Temco Electric Motor Co.

NEW YORK CITY—Silent Valve Co. of America; change of name to the Silent Valve Motor Co.

NEW YORK CITY—Silent Valve Motor Co.; increase of capital from $50,000 to $600,000.

SUPERIOR, WIS.—Northwestern Oil Co.; capital increased from $50,000 to $100,000

New Agencies Established During the Week

PASSENGER VEHICLES

Place	Car	Agent
Anaheim, Cal.	Kissel Kar	P. J. Weisel & Co.
Aberdeen, S. D.	R-C-H	Aberdeen Auto & Supply Co.
Bakersfield, Cal.	Kissel Kar	B. L. Brundage
Baltimore, Md.	American	American Auto Sales Co.
Boston, Mass.	Grant	H. J. Koehler Co.
Boston, Mass.	Metz	Metz Car Co.
Buffalo, N. Y.	Wahl	Monroe M. C. Co.
Camden, N. J.	R-C-H	Yale Motor Co.
Clarksville, Tenn.	Franklin	Williams & Runyon
Detroit, Mich.	R-C-H	A. H. Collins & D. E. Wells
Douglass, Ariz.	Kissel Kar	Douglass M. C. Co.
El Centro, Cal	Kissel Kar	Geo. Gilmore
Fresno, Cal.	Kissel Kar	J. C. Phelan
Galveston, Tex.	Kissel Kar	New Island City Garage
Gladwin, Mich.	R-C-H	F. L. Prindle
Golden, B. C.	Franklin	Franklin M. C. Co.
Greenville, Tex.	Kissel Kar	W. S. Mattox
Grosbeck, Tex.	Kissel Kar	Oliver-Nussbaum-Scharf Co.
Hartford, Conn.	Franklin	Universal Auto Co.
Hornell, N. Y.	Kissel Kar	E. B. Jones
Huron, S. D.	R-C-H	E. I. Bowe
Jamestown, N. D.	R-C-H	Wallace-Donnelly Co.
Joplin, Mo.	Kissel Kar	Lyscio & Walker
Kennebunk, Me.	R-C-H	Don Chamberlain
Kingsville, Tex.	Kissel Kar	Flato & Allen
Lakewood, N. J.	Franklin	McCue & Beecroft
Lexington, Ky.	Kissel Kar	Kentucky Kissel Kar Sales Co.
Los Angeles, Cal.	Cole	Lynn C. Buston
Lynn, Mass.	Henderson	Flynn Motor Co.
Middletown, N. Y.	Kissel Kar	The Empire Garage
Milwaukee, Wis.	Detroiter	Mitchell Auto Co.
Milwaukee, Wis.	Detroiter	Mitchell Auto Co.
Milwaukee, Wis.	Premier	Gas Power Eng. Co.
Milwaukee, Wis.	Pullman	E. B. Leverenz
Minneapolis, Minn.	Westcott	Macarthur-Zollars-Thompson Co.
Norwich, Conn.	R-C-H	Uncas Garage Co.
Oakland, Cal.	Kissel Kar	Pacific Kissel Kar Branch
Oakes, N. D.	Kissel Kar	J. W. Bush
Paterson, N. J.	Kissel Kar	Wm. Daly
Petaluma, Cal.	Kissel Kar	J. S. Peoples
Philadelphia, Pa.	Metz	Hall Rubber Co.
Pomona, Cal.	Kissel Kar	Fred Duvall
Pontiac, Mich.	R-C-H	R. H. Farmer & Son
Portland, Me.	R-C-H	F. D. Morse
Reno, Nev.	Kissel Kar	Reno Nevada Co.
Riverside, Cal.	Kissel Kar	G. A. Calkins
Salem, Mass.	Henderson	Flynn Motor Co.
San Antonio, Tex.	R-C-H	Velie Auto Sales Co.
San Bernardino, Cal.	Kissel Kar	J. T. Gentry
San Francisco, Cal.	Hudson	H. O. Harrison Co.
Santa Ana, Cal.	Kissel Kar	West End Garage
Springfield, Ill.	Franklin	City Garage
St. Cloud, Minn.	Kissel Kar	Nemic & Bisenius
St. Louis, Mo.	Dorris	R. C. Crawford & Co.
Tuckahoe, N. J.	R-C-H	A. B. Adams
Vevay, Ind.	Franklin	C. S. Tandy
Victoria, B. C.	Kissel Kar	Thos. Plimley
Waterloo, Ia.	Kissel Kar	Waterloo Kissel Kar Co.
Worcester, Mass.	King	King M. C. Co.

COMMERCIAL VEHICLES

Place	Car	Agent
Eau Claire, Wis.	Federal	Tanberg Auto Co.
Minneapolis, Minn.	Alma	Chase M. Truck Sales Co.
Superior, Wis.	Chase	Allen Peck Co.

ELECTRIC VEHICLES

Place	Car	Agent
Boston, Mass.	Rauch & Lang	Peerless M. C. Co.
Milwaukee, Wis.	Rauch & Lang	Hoppe-Hatter Auto Co.
Milwaukee, Wis.	Chicago	Mulkern Garage Co.

Accessories for the Automobilist

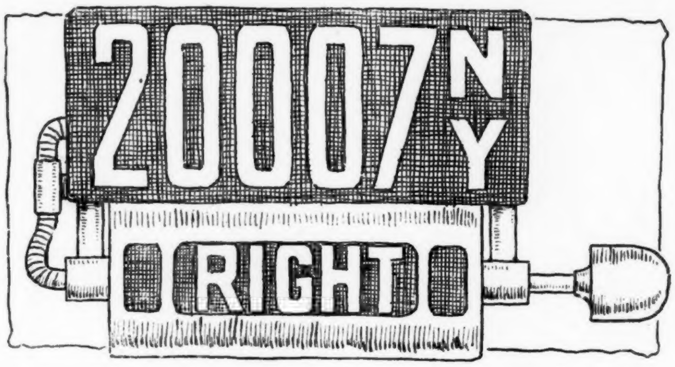


Fig. 3—Auto-Signalite device for indicating traveling direction

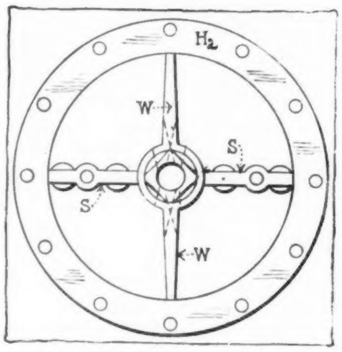


Fig. 1—Peteler principle

PETELER Shock Absorber—The Peteler Shock Absorber Corp., with a factory at 647 West Fiftieth street and offices at 1790 Broadway, New York City, is now marketing its product illustrated in Figs. 1 and 2. Fig. 1 shows the principle upon which the device absorbs the recoil, which is generally considered the more important part of the road shock. The absorber housing H2 is a cylindrical case containing a diametrical arm S rigidly fixed at its ends to the casing and a wing arm W which is turnable about a hollow spindle formed in the center of the casing and reaching from one side plate of the latter to the other. Wing and arm are connected to the spring ends. The whole interior of the casing is filled with oil, so that moving the wing in any way from the normal position shown in Fig. 1 creates two high-pressure and two low-pressure oil chambers. Fig. 2 shows how this pressure created by the shock is compensated for. The axis carrying the arm S has a hole H, through which the oil passes into the hollow spindle without obstruction, driving the piston P before itself, until the hole H_1 is opened and the oil passes through it into the low-pressure chamber. When the pressures have been equalized in this way the spring S_1 returns the piston to its former position. On the recoil, the oil must be forced from the enlarged—former low-pressure—chamber to the smaller chamber. It first passes through the hole H_1, drives the piston toward and past hole H and leaves through the latter. Depending on the degree to which this hole is uncovered by the piston the stroke of which is adjustable by means of the adjustment N, the oil is permitted to pass through H more or less rapidly, thereby softening the recoil. Thus the device is simple and positive. The adjustment is regulated by an arrow P_1 turnable around a dial D mounted on cap C.

Auto-Signalite—A new device for indicating the direction in which an automobile is traveling and for informing the driver following the car of intentions of turning, is being made by the Auto-Signalite Co., 103 East 125th street, New York City. This device, Fig. 3, consists of a longitudinal box in which a four-sided prism is suspended horizontally, operable by gearing so that any one side may be turned to the rear side of the box which is cut open, so that the words left, right, stop and danger, printed on the four respective sides of the prism, become visible if a gear on the shaft carrying it is turned to the respective positions. This gear is operated through a shaft and another set of gears mounted in a suitable position in front and reach of the driver. A disk carried by this end of the mechanism bears marks L, R, S and D, and a handle is turned toward the indication desired.

Blue Book Celluloid Holder—The Automobile Blue Book Publishing Co., Broadway and Seventy-sixth street, New York

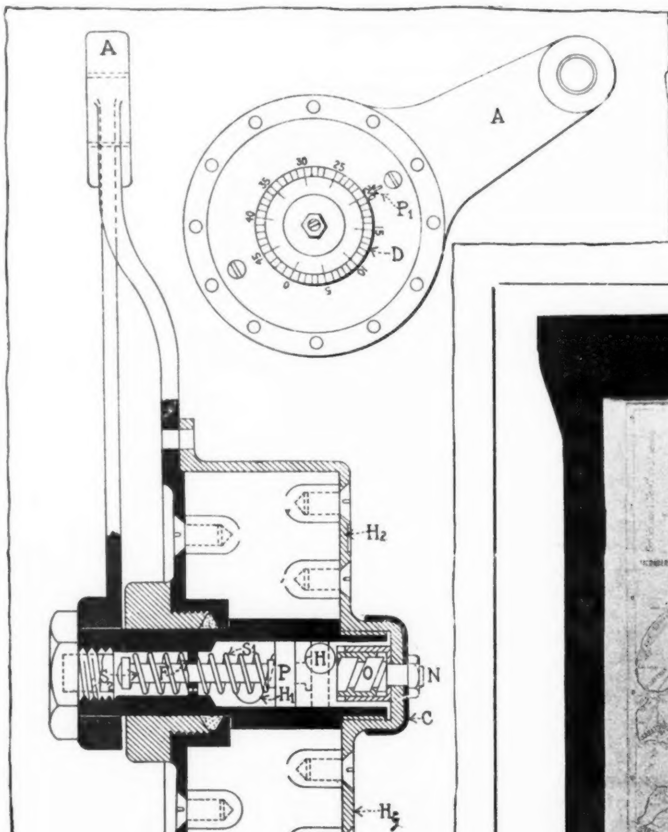


Fig. 2—Construction of Peteler absorber

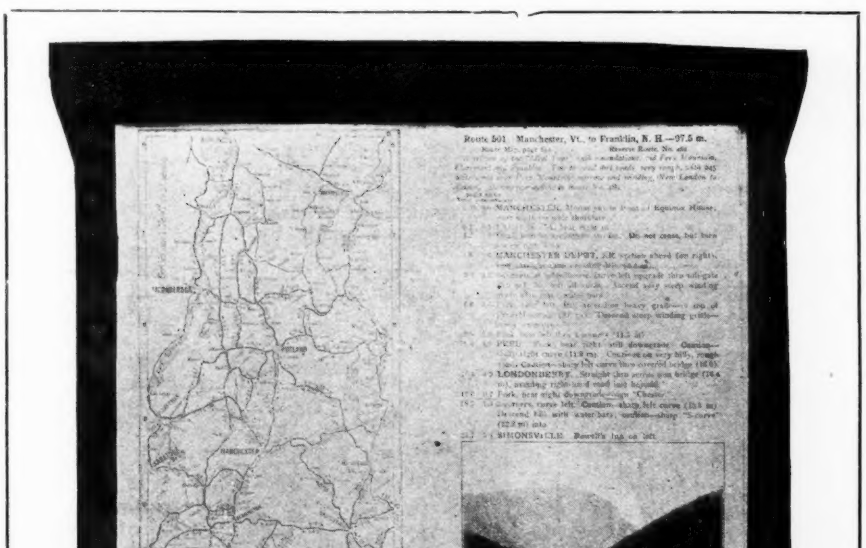
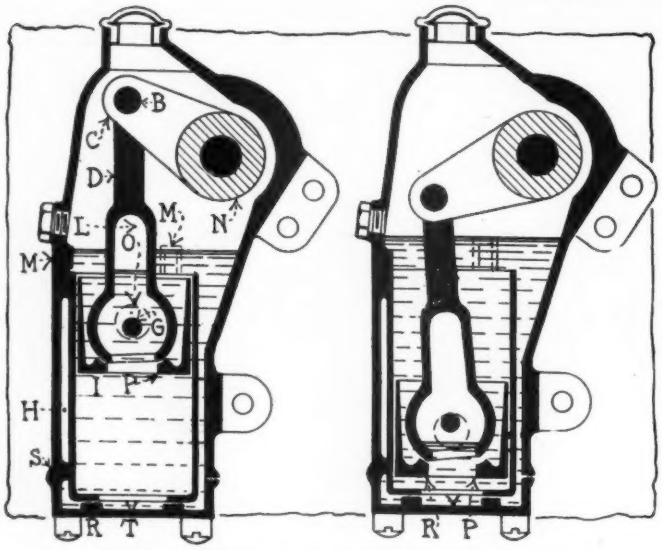
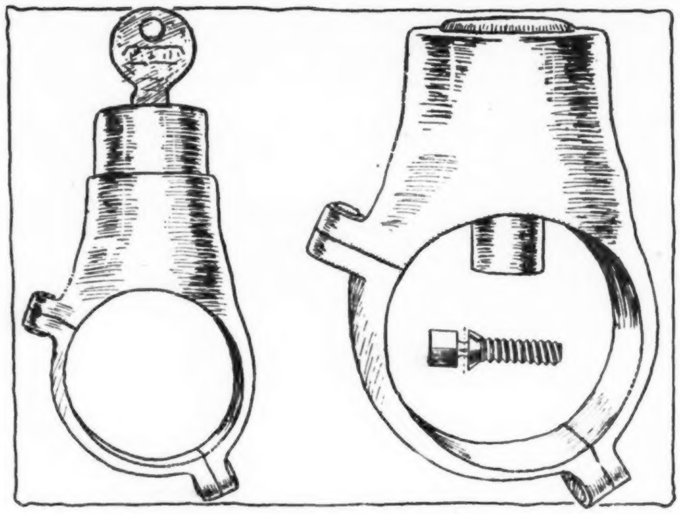


Fig. 4—Celluloid holder which is being made for easy use of Blue Books



Figs. 5-6—Sectional views of Landis shock absorber



Figs. 9-10—No-Risko lock for steering post and patent screw

City, sells celluloid-faced leather containers for Blue Book which may be attached to the windshield rail or any other suitable point in front of the driver. The holder is wide enough to permit of inserting the Blue Book spread open, the celluloid hinders reading in no way, but it prevents the leaves of the book from being upset by the wind.

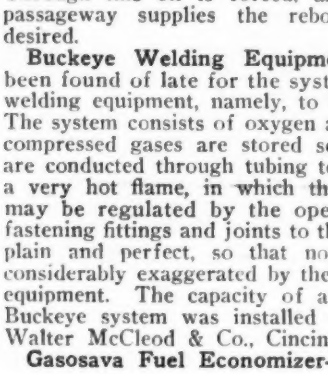
Landis Shock Diffuser—A hydraulic shock absorber filled with oil in which a piston operates is being made by the Landis Engineering Mfg. Co., Waynesboro, Pa. Figs. 5 and 6 show this device in section. The absorber casing holds a cylinder H capable of movement, which is limited by the lugs M and S. In the cylinder H, piston I is reciprocable; it is connected to rod D by pin G. A hole O in I, larger than G, permits of vertical movement of I. A steel pin B serves to connect the piston rod to link C. The latter is clamped on to face N to arms attached to the springs. Compression of the spring raises the piston and opens ball valve P. A partial vacuum is thereby produced under I, moving H upward to the limit of lug M. Oil then fills the interior of H. On the rebound rod D seats on I and closes P. Then H seats, closing the space between cylinder bottom and piston, only the opening T remaining free. Through this oil is forced, and the limited capacity of this passageway supplies the rebound-absorbing effect which is desired.

Buckeye Welding Equipment—A novel application has been found of late for the system well known as the Buckeye welding equipment, namely, to the manufacture of windshields. The system consists of oxygen and acetylene tanks, in which the compressed gases are stored separately, and from where they are conducted through tubing to a combination torch producing a very hot flame, in which the proportions of the two gases may be regulated by the operator. The welding-on of the fastening fittings and joints to the windshields must be extremely plain and perfect, so that no faults show, which would be considerably exaggerated by the subsequent nickel-plating of the equipment. The capacity of a welding department where the Buckeye system was installed was thereby multiplied fivefold. Walter McCleod & Co., Cincinnati, O., make this product.

Gasosava Fuel Economizer—The Gasosava, made by the Gas Saver Sales Co., 1790 Broadway, New York City, is a simple device constructed for the increase of fuel economy. Two principles are embodied in this product, that of breaking up the liquid globules which pass through the carbureter without having been vaporized, and that of thoroughly gasifying the smaller particles formed thereby. In this way eventual power loss through the obstruction of the breaking-up device is compensated for and the total effect of increased fuel economy obtained. The saver, Fig. 7, consists of a close-mesh brass screen held in a sheet-copper rim; between both there is a hand-made wick. The entire device is placed between the carbureter and manifold flanges. The mixture carrying liquid parts with it, is broken up by the brass screen, and the smaller particles are finally and positively vaporized by the surface action of the wick. Besides, the close-mesh screen is a positive guard against back-firing from the motor into the carbureter.

No-Risko Automobile Lock—One of the most ingenious devices which have appeared on the accessories market of late is the No-Risko automobile lock, Figs. 9 and 10. This lock is secured to the steering post in such a manner that it cannot be removed therefrom, and the locking device consists in a spring-pressed piston which enters a suitably cut hole in the steering post shaft if the key of a Yale lock included in the device is turned. The lock is mounted as follows. The car is brought to a stop close to the curb, the wheels being turned toward the latter; then a hole, big enough to permit of the spring piston's entering is bored through the steering post housing and into the shaft. Now the device is mounted, and the piston, if in the unlocked position, passes through the housing but not into the shaft proper. This having been done, the back half of the lock-ring is attached to the front half, by means of specially formed screws. These are fitted with a bolt head of relatively soft metal, and having been turned into the thread as tightly as possible so as to keep the ring halves securely together the bolt head of soft metal is turned or broken off, making the removal of the screw impossible. After locking, the key is removed, and there is no way of transporting the car except by loading it on a truck. The No-Risko is also made in a model where the lock controls an electric switch, as well as a combination lock and switch model, and three types specially designed for Ford cars are also obtainable. It is sold by the Auto Specialty Sales Co., 1790 Broadway, New York City.

Jahnke Welder and Cutter—The Jahnke Welding & Supply Co., San Francisco, Cal., manufactures a welding torch, Fig. 8, in which the flow of acetylene and oxygen is regulated by a single valve, an injector type of nozzle being used to obtain the correct proportioning of the gases. As the illustration shows, a tank is used for each gas, and after the proper pressure adjustments have been made according to gauge indications, the device is ready at all times for immediate application. The one-valve feature permits of controlling the device, during the operation, with one finger. The tip of each nozzle is of a material which does not melt or crack in the heat produced by the oxy-acetylene flame, and to provide for the requirements of various jobs, each outfit sold by the Jahnke concern includes seven nozzles and tips therefor. In addition the gauge each for acetylene and oxygen and a copper coil, the equipment also includes 12 feet of high-grade hose for each gas. A special, water-cooled torch in which the nozzle includes a water jacket, is supplied for working in inaccessible places where heat is apt to store.



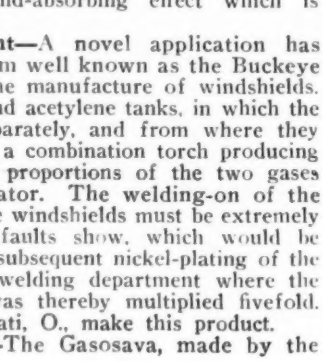


Fig. 7—Gasosava. Fig. 8—Jahnke welding outfit